SDMS Document
111422

Contract No. 68-W-98-210

# RAC II

***Remedial Response, Enforcement Oversight and Non-time Critical Removal Activities at Sites of Release or Threatened Release of Hazardous Substances in EPA Region II***

CDM

RESPONSE ACTION CONTRACT
FOR REMEDIAL RESPONSE, ENFORCEMENT OVERSIGHT,
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR
THREATENED RELEASE OF HAZARDOUS SUBSTANCES
IN EPA REGION II

# FINAL WORK PLAN
# VOLUME I

# OLD ROOSEVELT FIELD
# CONTAMINATED GROUNDWATER AREA SITE
# REMEDIAL INVESTIGATION/FEASIBILITY STUDY
# NASSAU COUNTY, NEW YORK

Work Assignment No. 146-RICO-02PE

U.S. EPA CONTRACT NO. 68-W-98-210
Document Control No.: 3223-146-PP-WKPN-05167
December 10, 2004

Prepared for:
U.S. Environmental Protection Agency
290 Broadway
New York, New York 10007-1866

Prepared by:
CDM Federal Programs Corporation
125 Maiden Lane, 5th Floor
New York, New York 10038

This document has been prepared for the U.S. Environmental Protection Agency under Contract No. 68-W-98-210. The material contained herein is not to be disclosed to, discussed with, or made available to any person or persons for any reason without prior expressed approval of a responsible official of the U.S. Environmental Protection Agency.

CDM
125 Maiden Lane, 5th Floor
New York, New York 10038
tel: 212 785-9123
fax: 212 785-6114

December 10, 2004

Mr. Fernando Rosado
Project Officer
U.S. Environmental Protection Agency
290 Broadway
New York, NY 10278

Ms. Caroline Kwan
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 20th Floor
New York, NY 10278

| | |
|---|---|
| Project: | RAC II Contract No.: 68-W-98-210<br>Work Assignment: 146-RICO-02PE |
| Doc. Control No.: | 3223-146-PP-WKPN-05167 |
| Subject: | Final Work Plan, Volume I<br>Old Roosevelt Field Contaminated Groundwater Area Site<br>Remedial Investigation/Feasibility Study<br>Nassau County, New York |

Dear Mr. Rosado and Ms. Kwan:

CDM Federal Programs Corporation (CDM) is pleased to submit this Final Work Plan Volume I for the RI/FS for the Old Roosevelt Field Contaminated Groundwater Area Site in Nassau County, New York. Revisions to the work plan include:

- Changes discussed during the negotiation on November 24, 2004
- Changes related to modifications in drilling methodology and reduction in the number of multi-port wells
- Changes based on the Response to Comments letter dated February 14, 2002

If you have any comments concerning this submittal, please contact me at (212) 785-9123 or Ms. Susan Schofield at (203) 262-6633.

Very truly yours,
CDM FEDERAL PROGRAMS CORPORATION

Robert D. Goltz

Robert D. Goltz, P.E.
RAC II Program Manager

cc: D. Butler, EPA Region II
J. Litwin, CDM
B. Irons, CDM
S. Schofield, CDM
L. Campbell, CDM
RAC II Document Control

RESPONSE ACTION CONTRACT
FOR REMEDIAL RESPONSE, ENFORCEMENT OVERSIGHT,
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR
THREATENED RELEASE OF HAZARDOUS SUBSTANCES
IN EPA REGION II

# REMEDIAL INVESTIGATION/FEASIBILITY STUDY
# OLD ROOSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK
Work Assignment No. 146-RICO-02PE

## FINAL WORK PLAN
## VOLUME I

U.S. EPA CONTRACT NO. 68-W-98-210
Document Control No.: 3223-146-PP-WKPN-05167
December 10, 2004

Prepared by: Susan Schofield — Date: 12/10/2004
Susan Schofield, P.G.
Site Manager

Reviewed by: J. Litwin — Date: 12/10/04
Jeanne Litwin, REM
RAC II Technical Operations Manager

Approved by: Robert D. Goltz — Date: 12/10/04
Robert D. Goltz, P.E.
RAC II Program Manager

# Contents

# Contents

## 5 Task Plans

## Tables



## Figures



## Appendices

# 1 Section One

# Section 1 Introduction

CDM Federal Programs Corporation (CDM) received Work Assignment Number 046-RICO-02PE under the Response Action Contract (RAC) II program to perform a Remedial Investigation/Feasibility Study (RI/FS) for the United States Environmental Protection Agency, Region II (EPA) at the Old Roosevelt Field Contaminated Groundwater Area (Roosevelt) site located in Nassau County, New York. The purpose of this work assignment is to evaluate the nature and extent of groundwater contamination and determine the appropriate remedial alternatives for the identified contamination.

For presentation purposes, work plan figures and tables are presented at the end of Volume I.

## 1.1 Overview of the Problem

The history and background information about the Roosevelt site is summarized from the Hazard Ranking System (HRS) package prepared by Roy F. Weston (2000).

The Roosevelt site is located on the eastern side of Clinton Road approximately 0.6 mile south of the intersection with Old Country Road, which was the northwest corner of Roosevelt Field and its predecessors. Roosevelt Field was used for a variety of aviation activities from 1911 until May 1951. The original airfield, known as the Hempstead Plains Aerodrome, encompassed 900 to 1,000 acres east of Clinton Road and south of Old Country Road. The United States (U.S.) military began using the Hempstead Plains field before the U.S. entered World War I. When the U.S. entered the war in April 1917, the airfield was taken over as a training center for military pilots and renamed Hazelhurst Field. On September 24, 1918, the Army changed the name to Roosevelt Field.

After World War I, the U.S. Air Service authorized some companies to operate from Roosevelt Field but maintained control until July 1, 1920, when the Government sold its buildings and improvements and relinquished control of the field. Subsequently, the property owners sold portions along the southern edge of the field and split the remainder of the property into two separate fields, Roosevelt Field on the eastern half and Curtiss Field on the west. Both fields were bought in 1929 by Roosevelt Field, Inc., and the consolidated property called Roosevelt Field. The eastern field was sold in 1936 and became a racetrack; the western field at the corner of Clinton and Old Country Roads continued to operate as an aviation center.

During World War II, Roosevelt Field was used by the Navy and Army. After the war, Roosevelt Field reverted to a commercial airport until it closed in May 1951. Building construction at the site began in 1956. The Roosevelt Field Shopping Mall and Garden City Plaza currently occupy the area that was Roosevelt Field.

Garden City public supply wells 10 and 11 were installed at what had been the southwestern corner of the airfield in 1952 and were put into use in 1953. The wells have shown the presence of trichloroethene (TCE) and tetrachloroethene (PCE) since they were first sampled in the late 1970s and the early 1980s. The concentrations have been as high as 720 micrograms per liter (μg/L) of TCE and 510 μg/L of PCE in well 10 and 550 μg/L of TCE and 160 μg/L of PCE in well 11. In 1987, an air-stripping treatment system was installed at the wells to remove volatile organic compounds (VOCs) from the raw water. Sample results of treated well water from May 1993, September 1995, and June/July 1999 indicated that breakthrough of the treatment system had occurred on those occasions (Weston 2000). Each well serves an estimated 3,428 people. The treatment system on the wells has been upgraded, with each well treated by a dedicated air stripper. Nassau County conducts regular well sampling and no breakthrough has taken place since the air stripper upgrades.

The Roosevelt site is a contaminated groundwater plume that will be investigated by EPA as the lead regulatory agency. Currently, the plume is documented by the presence of PCE, TCE, carbon tetrachloride, and 1,1-dichloroethene (1,1-DCE) at concentrations that exceed health benchmarks. Historically, the highest levels of TCE (at 38,000 μg/L in 1984) were detected in cooling water well N8050, located approximately 2,000 feet north-northeast of the Garden City wells. The two Garden City supply wells and well N8050 are located on the property that historically was Roosevelt Field. Well N8050 ceased pumping in the mid 1980s. The sources of contamination are suspected to be the airport hangar areas, but specific sources have not been determined.

## 1.2 Approach to the Development of the Work Plan

CDM reviewed all available information on the Roosevelt site prior to formulating the scope of work presented in this work plan. Section 8.0 provides a list of all documents reviewed and referenced during development of the work plan. The RI/FS for the Roosevelt site will be completed in three phases: a remedial investigation (RI), risk assessments (RAs), and a feasibility study (FS).

The RI will focus on collecting adequate groundwater data to characterize the nature and extent of groundwater contamination and to identify potential hot spot areas. The sampling approach is discussed in Section 5.0. A quality assurance project plan (QAPP) detailing sample and analytical requirements for the field investigation and a health and safety plan (HSP) will be submitted separately. The RI report will provide a complete evaluation of sampling results.

The RAs for the Roosevelt site will evaluate the risk from exposure to contaminated groundwater. The human health RA will be conducted according to EPA's *Risk Assessment Guidance for Superfund* (Part A 1989a and Part D 1998) or according to the most recent EPA guidance and requirements. The ecological risk assessment will be an optional subtask. If directed by EPA, the ecological RA will be conducted according to EPA's *Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Risk Assessments* (ERAGS) (EPA 1997a) or according to the most current EPA guidance and requirements. The risk assessments will include a list of contaminants of potential concern (COPCs); toxicology of COPCs; transport, degradation, and fate analysis of COPCs; comparison of COPCs to Applicable or Relevant and Appropriate Requirements (ARARs); and determination of potential risk.

An FS will be completed in accordance with EPA guidance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) "Interim Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA 1988a), or the most recent EPA FS guidance document. The FS will develop and screen remedial alternatives and provide detailed analysis of selected alternatives, including the "No Action" alternative. The remedial alternatives will be evaluated against the nine criteria required by EPA guidance documents: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; (5) short-term effectiveness; (6) implementability; (7) cost; (8) state acceptance; and (9) community acceptance.

## 1.3 Work Plan Content

This work plan contains nine sections, as described below.

| | |
|---|---|
| Section 1 | Introduction - The introductory section lays out the format of the work plan. |
| Section 2 | Site Background and Setting - This section describes the site background, including the current understanding of the location, history, and existing conditions at the site. |
| Section 3 | Initial Evaluation - This section presents the initial evaluation of existing data; it includes a description of previous sampling results, site geology and hydrogeology, a preliminary identification of ARARs, brief discussions on the human health and ecological risk assessments, and initial evaluations of potential treatment technologies that may be applicable to the type of contamination at the site. |
| Section 4 | Work Plan Rationale - This section includes the Data Quality Objectives (DQOs) for the RI sampling activities and the approach for preparing the work plan to satisfy the DQOs. |
| Section 5 | Task Plans - This section presents a discussion of each task of the RI/FS in accordance with the Roosevelt site RAC II Statement of Work and discussions with EPA. |
| Section 6 | Schedule - The project schedule is presented in this section. |
| Section 7 | Project Management Approach - Project management considerations that define relationships and responsibilities for selected task and project management teams are described. |
| Section 8 | References - The references used to develop material presented in this work plan are listed in this section. |
| Section 9 | Glossary of Abbreviations - The acronyms and abbreviations used in the work plan are defined in this section. |

# 2

# Section Two

# Section 2
# Site Background and Setting

## 2.1 Site Location and Description

The Roosevelt site is an area of groundwater contamination within the Village of Garden City, in central Nassau County, New York. The site is located on the eastern side of Clinton Road, approximately 0.6 mile south of the intersection with Old Country Road. Figures 2-1 and 2-2 provide a site location and a site map, respectively. The Roosevelt site consists of a thin strip of open space along Clinton Road (known as Hazelhurst Park), a large retail shopping mall with a number of restaurants, and movie theater. Several office buildings (including Garden City Plaza) are on the perimeter, sharing parking space with the shopping mall. The Village of Garden City water supply wells 10 and 11 are south of the mall complex, just off Clinton Road. Two recharge basins are directly east and south of the supply wells. The eastern basin, Pembrook, is on the property owned by the shopping mall. The basin to the south is Nassau County Storm Water Basin number. 124.

Currently the plume is documented by the presence of PCE, TCE, 1,1-DCE, and carbon tetrachloride at concentrations above health benchmarks in the Village of Garden City public supply wells 10 and 11 (N3934 and N3935). Historically, the highest levels of TCE were detected in cooling-water well N8050, located approximately 2,000 feet north-northeast of the Garden City wells. Garden City wells 10 and 11 and well N8050 are all located on the property that was Roosevelt Field.

## 2.2 Site History

The history of the Roosevelt site is summarized from the HRS package prepared by Roy F. Weston (2000).

The Roosevelt site was used for aviation activities from 1911 to 1951. The original airfield was known as the Hempstead Plains Aerodrome and encompassed 900 to 1,000 acres east of Clinton Road and south of Old Country Road. By the time the field opened in July 1912, there were 5 cement and 30 wooden hangars along Old Country Road, 4 grandstands along Clinton Road, and several flying schools. At least two aviators built aircraft at the field in 1912, including the first all-metal monoplane in America. During its first three years, activities at the airfield included civilian flight training, equipment testing, and aerial stunt shows.

The U. S. military began using the Hempstead Plains field prior to World War I. The New York National Guard First Aero Company began training at the airfield in 1915, and in 1916 the U.S. Army used the field to train Army and Navy officers. When the U. S. entered the war in April 1917, the airfield was taken over as a training center for military pilots and renamed Hazelhurst Field. The Army removed the grandstands, built barracks along Clinton Road, and built larger hangars along Old Country Road. In 1918, the Army changed the name of the airfield to Roosevelt Field in honor of Quentin Roosevelt, a son of Theodore Roosevelt who had trained there and was killed during the war. Roosevelt Field was used throughout the war to train aviators.

After the war, the U. S. Air Service authorized aviation-related companies to operate from Roosevelt Field, but maintained control until July 1, 1920, at which time the Government sold its buildings and relinquished control of the field. Subsequently, the property owners sold portions along the southern edge of the field and split the remainder of the property into two flying fields with an incline between them. The eastern half, with sod runways and only two hangars, continued as Roosevelt Field. The western half, which had many hangars, flying schools, and aviation maintenance shops, became known as Curtiss Field.

By 1929, the eastern field (Roosevelt) had served as the starting point or terminus of many notable flights, including Lindbergh's takeoff for his historic trans-Atlantic flight in May 1927. The western field (Curtiss) was used for flying circuses, a flying school, aircraft sales and service, and flight tests. Both fields were bought in 1929 by Roosevelt Field, Inc., and the property was once again called Roosevelt Field. Improvements were quickly made, including the installation of several large steel and concrete buildings for hangars, shop, and office space along Old Country Road. As of November 1929, numerous aviation-related businesses operated in the hangars and other buildings surrounding the western field. By 1932, paved runways and 50 buildings made Roosevelt Field the country's largest and busiest civil airfield. While the western field developed into the large aviation center that continued to operate throughout the 1930s, the eastern field remained unpaved, with few buildings, until it was leased in 1935 and became a racetrack.

Roosevelt Field was used by the Navy and Army during World War II. In July 1939, the Army Air Corps contracted Roosevelt Field, Inc. to provide airplane and engine mechanics training to Army personnel at their school. In early 1941, there were more than 200 Army students and approximately 600 other students at the Roosevelt Aviation School. At the beginning of 1942, after the U.S. had entered the war, civilian flying and private hangar rental had ceased at Roosevelt Field due to a ban on private flying in defense areas.

As of March 1942, there were 6 steel/concrete hangars, 14 wooden hangars, and several other buildings at Roosevelt Field. The Army training school was concentrated in the buildings located along Clinton Road. In addition to the training activities, the Roosevelt Field facilities were used for receiving, refueling, crating, and shipping Army aircraft.

The Navy also used Roosevelt Field during World War II. In November 1942, the Navy Bureau of Aeronautics established a modification center at Roosevelt Field to install British equipment into U.S. aircraft for the British Royal Navy. The Navy leased five steel/concrete hangars along Old Country Road; built a barracks, mess hall, and sick bay; commissioned U.S. Naval Air Facility (NAF) Roosevelt Field by February 1943. By September 1943, the Navy had built wooden buildings between four of the hangars, and in October 1943 leased six additional hangars. NAF Roosevelt Field was responsible for aircraft repair and maintenance, equipment installation, preparation and flight delivery of lend-lease aircraft, and metal work required for the installation of British modifications. The metal work constituted a substantial portion of the facility's work load. The facility also performed salvage work of crashed Royal Navy planes. The Navy vacated all but six hangars shortly after the war ended, and removed their temporary buildings by the time their lease expired on June 30, 1946. Restoration of buildings and grounds was completed by August 1946, and Roosevelt Field operated as a commercial airport until it closed in May of 1951.

Soon after the airfield closed, industrial plants for precision electronic instruments were under construction at Roosevelt Field and further development was planned. The large Roosevelt Field Shopping Center was constructed at the site and opened in 1957. The old field is currently the site of the shopping mall and office building complexes and is surrounded by commercial areas and light industry. Three of the old Navy hangars remained standing until some time after June 1971, with various occupants, including a moving/storage firm, discotheque, amusement center, and bus garage.

It is possible that chlorinated solvents were used at Roosevelt Field during and after World War II. Chlorinated solvents such as PCE and TCE have been widely used for aircraft manufacturing, maintenance, and repair operations since about the 1940s. By May 1938, the Bureau of Aeronautics had a specification covering TCE and had approved at least one company to supply TCE. The finish specifications for at least one type of plane that the Navy modified at Roosevelt (eight of which were on site in April 1943) calls for aluminum alloy to be cleaned with TCE. An aircraft engine overhaul manual issued in January 1945 specified TCE as a degreasing agent. A book written in 1992 stated that for the previous half-century the U.S. military, particularly the Air Force, had indiscriminately poured solvents including TCE into the ground at virtually all of their bases. Standard maintenance at almost every Air Force base involved spraying planes liberally with solvents to clean and deice them.

Village of Garden City water supply wells 10 and 11 were installed in 1952, at what had been the southwest corner of the airfield and were put into service in 1953. Well 10 is screened from 377 to 417 feet bgs and well 11 is screened from 370 to 410 feet bgs. Both wells have shown the presence of PCE and TCE since they were first sampled in the late 1970s and early 1980s, and concentrations have increased significantly since then. In 1987, an air-stripping treatment system was installed at the site to remove VOCs from the water supplied by wells 10 and 11. Sampling results of treated well water from May 1993, September 1995, and June/July 1999 indicated that breakthrough of the treatment system had occurred.

## 2.2.1 Previous Investigations

Several investigations of groundwater contamination in the vicinity of Old Roosevelt Field have been conducted. The primary results are summarized below.

Roosevelt Field Groundwater Contamination Study - Nassau County Department of Health (NCDH), Geraghty & Miller, 1986. The results of this study indicated that the pumping from the Magothy aquifer by nearby non-contact cooling water wells and discharge of the spent cooling water to Pembroke Basin were significantly affecting seasonal water table elevations. Vertical flow was occurring between the water table aquifer and the underlying principal source aquifer at Roosevelt Field. The highest concentrations of VOCs in the water table aquifer were detected south (and downgradient) from the recharge basin, attributed to discharge of contaminated cooling water to the recharge basin. Total VOC concentrations were up to 1,115 parts per billion (ppb), chiefly composed of TCE and PCE. A cone of depression around pumping wells appeared to have a strong influence on the movement of contaminants in the vicinity of downgradient monitoring wells. The highest contamination detected in deep wells at Roosevelt Field was found in cooling water well N8050 (40,890 ppb total VOCs) located near the northwest corner of the shopping center. Other deep wells sampled 1,000 feet north of N8050 (N6045) and 500 feet to the west (N5485 and N8458) showed much lower concentrations, suggesting that the source of the contamination is derived on site near well N8050. Deep well samples on the southern portion of the site contained significant concentrations of carbon tetrachloride; whereas, the most contaminated deep wells on the northern portion of the site (e.g., N8050) did not contain more than trace concentrations of carbon tetrachloride. Geraghty and Miller concluded these differences in concentration and composition of VOC contaminants may be attributed to more than one source or that the same source discharged different contaminants over time.

<u>Environmental Assessment Report- Subsurface Investigation for Soil Contamination for the Proposed Clinton Road/Stewart Avenue Bypass at Roosevelt Field - Nassau County Department of Public Works (NCDPW), Camp, Dresser and McKee, 1987</u>. Eighteen shallow and 11 deep borings were installed in the western section of the site to provide an assessment of the potential impact from excavation of contaminated soil during construction of a new road. None of the samples collected from the 29 soil borings had detections of the contaminants of concern.

<u>United States Geological Survey (USGS) Water Resources Investigation 86-4333, 1989</u>. From March 1982 through September 1984, the USGS, NCDH, and NCDPW completed a cooperative study to evaluate the occurrence and movement of VOCs in the groundwater at Roosevelt Field. A well network consisting of 52 monitoring wells, 28 public supply wells and 25 cooling water wells were sampled in a 10 square mile area. To supplement the investigation, seven additional shallow and two deep Magothy Aquifer wells were installed. The USGS identified three separate plumes of chlorinated VOCs (TCE, PCE, and degradations products) emanating from the Roosevelt Field area, with the plumes extending south into a residential portion of Garden City

<u>Field Report Summary, New York Superfund Standby Contract, Garden City Schools Field Investigation, H2M Group, 1993</u>. Following concerns that organic solvents in groundwater may be impacting area schools via release of soil vapor to the vadose zone, in 1993 the New York State Department of Environmental Conservation (NYSDEC) ordered soil vapor samples be collected from Stewart School located approximately 3,000 feet southwest and hydraulically downgradient from potential source areas identified at Roosevelt Field. Five soil vapor samples were collected from 10 feet below grade around the perimeter of the Stewart School (5-10 feet from the

building). Groundwater samples also were collected at each soil gas sampling location and submitted for laboratory analysis. The samples were analyzed for VOCs and chlorinated VOCs. Laboratory results for the samples collected at Stewart School indicated neither VOCs nor chlorinated VOCs were detected in groundwater or soil vapor.

## 2.3 Current Conditions

The site currently consists of a large shopping mall, numerous restaurants, a movie theater, and office buildings which ring the shopping mall. Most of the open space at the site is asphalt parking areas for the shopping mall and office buildings. The western portion of the site contains the Village of Garden City water supply wells, two recharge basins and a small strip of open space just east of Clinton Road. The Garden City supply wells are currently active, pumping approximately 1.4 million gallons per day (mgd). All groundwater from the two wells is treated on-site by dedicated air strippers. All of the cooling water wells have either been abandoned or taken out of service.

# 3 Section Three

# Section 3
# Initial Evaluation

## 3.1 Review of Existing Data

### 3.1.1 Topography
The site is located within the Atlantic Coastal Plain of New York. The topography of the central portion of Nassau County is characterized by a gently southward-sloping glacial outwash plain. Two linear chains of hills, the remnants of two glacial terminal moraines, border the outwash plain to the north; the southern limit of the outwash plain is defined by the low-lying salt marshes, tidal inlets and creeks, and beach-barrier islands along the Atlantic coast of southern Long Island. The southern chain of the two chains of morainal hills, the Ronkonkoma moraine, extends from Queens eastward to form the South Fork of Long Island. The northern chain of hills, the Harbor Hill moraine, extends eastwards to form the North Fork (Franke and McClymonds 1972; Krulikas 1987). The moraines converge to the west of Nassau County (Figure 3-1). The Ronkonkoma moraine reaches elevations of up to 400 feet above mean sea level (msl).

The site is flat to gently undulating. According to the USGS *Freeport* 1:24,000 Topographic Quadrangle, the site slopes from approximately 100 feet above msl at the northern edge of the site (along Old Country Road) down to approximately 70 feet above msl at the Village of Hempstead public water supply wells located about 4,000 feet south-southwest of Roosevelt Field, along Clinton Road (Figure 3-2). The Roosevelt Field shopping center is located on a flat plateau-like area, originally called Hempstead Plains (Weston 2000), which is at an elevation of approximately 90 feet above msl.

### 3.1.2 Drainage and Surface Water Quality
No naturally-occurring surface water bodies are present in the vicinity of the Roosevelt site. The closest stream is East Meadow Brook, which is about 1.5 miles southeast of the site and flows south towards Great South Bay and the Atlantic Ocean. The largest body of freshwater near the site is Hempstead Lake, located at the head of Millbrook Creek, approximately four miles south of the site (Franke and McClymonds 1972). The majority of natural ponds and lakes are kettleholes that intersect the water table (Krulikas 1987). In general, the sandy nature of natural soils on Long Island promotes fast infiltration of precipitation (rainwater) from the ground surface. Almost the entire site area is paved or is occupied by buildings; as such, any surface rainwater runoff is routed into storm water collection systems and commonly is discharged directly to either dry wells or recharge/detention basins.

The Pembrook recharge basin and two Nassau County recharge basins are three man-made water table recharge basins located on site. One of the Nassau County basins is located immediately south of the Pembrook Basin, approximately 1,500 feet southwest of the Roosevelt Field Shopping Center; the other county recharge basin is located about 1,000 feet southeast of the shopping center (Figure 2-2). The privately-owned Pembrook Basin formerly received contaminated cooling water discharge (Eckhardt and Pearsall 1989). Currently it appears to receive surface water runoff during storm events. The Nassau County basins receive storm runoff from the municipal storm water collection system.

A number of freshwater ponds and streams in the Atlantic/Long Island Sound drainage basin, in which the site is located, have fish consumption advisories, primarily due to polychlorinated biphenyl (PCB) and/or pesticide contamination, in particular, chlordane (NYSDEC 2000). This is presumably due to the extensive use of chlordane as an insecticide. The New York State Department of Health (NYSDOH) has also issued specific advisories limiting the consumption of specific species of fish from the waters along the south shore of Long Island.

## 3.1.3 Geological and Hydrogeological Characteristics

### 3.1.3.1 Regional Geology

The site is located within the Atlantic Coastal Plain Physiographic Province. A history of coastal submergence and emergence spanning the Cretaceous Period, significant differential erosion during the Cenozoic, and glaciation during the Quaternary is reflected in the present day geology of Long Island (Lubke 1964). The geology of Long Island is characterized by a southeastward-thickening wedge of unconsolidated sediments unconformably overlying a gently-dipping basement bedrock surface (Figure 3-3). The wedge ranges in thickness from zero feet beneath Long Island Sound to the north, on the submerged western margin of the Coastal Plain, to more than 2,000 feet under the southern shores of Long Island.

The unconsolidated sedimentary wedge in the vicinity of the Roosevelt site in central Nassau County thickens from about 800 feet at the northern edge of the Town of Hempstead to approximately 1,500 feet thick beneath the barrier islands (Krulikas 1987). A generalized regional stratigraphy for the Town of Hempstead is presented in Figure 3-4 and is described in detail below.

<u>Basement</u>
Basement is composed of Precambrian to Early Paleozoic igneous or metamorphic consolidated bedrock. Unconformably overlying the basement is a thick succession of Late Cretaceous deposits: the Raritan and overlying Magothy Formations, both of fluvio-deltaic depositional origin. The Upper Cretaceous deposits are unconformably overlain by a veneer of Pliocene and Pleistocene deposits, chiefly of glacial origin (Franke and McClymonds 1972).

<u>Cretaceous</u>
<u>Raritan Formation</u>: The Raritan Formation is divided into the basal Lloyd Sand Member and the overlying Raritan Clay Member. The Lloyd Sand rests unconformably on bedrock and is 200-250 feet thick in the Hempstead area (Krulikas 1987; Buxton, *et al.* 1989). The top of the Lloyd Sand is found at approximately 600 feet below msl. It is composed of white and grey fine to coarse sand and gravel, commonly with a clayey matrix. The contact with the overlying clay member is gradational.

The Raritan Clay Member is composed chiefly of bedded variegated clay and silt, locally containing interbedded sands. Lignite fragments and iron and pyrite nodules are common. The clay member is approximately 100 feet thick in the Hempstead area (Smolensky, *et al.* 1989). The Raritan Clay is the most widespread hydrologic confining layer on Long Island. Figure 3-5 is a subcrop map of the top-Raritan Clay Member in the Hempstead area, from Smolensky, *et al.* (1989). The map indicates the Raritan's updip erosional pinchout generally is located subparallel to the northern coast of Nassau County. The clay unit dips gently to the south-southeast. Depth to the top of the clay member beneath the study area is approximately 500 feet below msl on the southern margin of the site. A deep test well drilled by the Village of Garden City in 1982 (well number N10033) was completed within the Raritan Clay unit, described as a predominantly solid grey clay unit with fine to medium-grained sand interbeds. The top of the Raritan Clay was identified at approximately 400 feet below msl at former Town of Hempstead public supply well N5485 located at the Roosevelt Field mall (Eckhardt and Pearsall 1989) and 504 feet below msl at the Village of Garden City public supply wells (N10033 and N10034) about one mile further to the southwest (Buxton, *et al.* 1989).

Matawan Group-Magothy Formation (Magothy): The Magothy unconformably overlies the Raritan; the contact is commonly marked by a change from the solid clays of the Raritan Clay Member to coarse sands and gravels of the basal unit of the Magothy. The dominant Magothy lithology generally is fine to medium quartz sand, interbedded clayey sand with silt, clay, and gravel interbeds or lenses. Interbedded clay is more common towards the top of the formation. The thickness of the Magothy in the Hempstead area varies between 350 feet in the northern portion of Hempstead to over 800 feet beneath the barrier islands (Krulikas 1987). The Magothy is approximately 525 feet thick in well N10033 at the Roosevelt site. Subcrop maps of the top-Magothy Formation in the Hempstead area indicate the top of the Magothy is encountered at approximately 30 feet above msl at the Roosevelt site, dipping gently southwards down to approximately mean sea level two miles south in the Village of Hempstead (Krulikas 1987; Smolensky, *et al.* 1989)

Cenozoic-Quaternary

After the Cretaceous, deep erosion of the land surface took place as a response to fluctuations in sea level. Sedimentological evidence indicates that sea level falls exposed the entire Atlantic continental margin during the Miocene epoch, which would have promoted rejuvenation and deep incision of rivers and streams across the Coastal Plain (Fulthorpe, *et al.* 1999). Later deposition of abundant fluvial and glacial clastic deposits during the Pliocene and Quaternary filled these incised buried valleys. The top of the Cretaceous sequence is marked by a highly irregular erosion surface upon which rests deposits of Pleistocene and, in some places, Pliocene age. A structural contour map of the top-Cretaceous for the Hempstead area, presented in Krulikas (1987), indicates the top-Cretaceous unconformity surface is incised by a predominantly north-northeast and south-southwest trending paleovalley beneath the barrier islands south of the site.

Pleistocene Deposits: Deposits of Pleistocene age mantle the Cretaceous formations. Within the study area, the Pleistocene deposits include three depositional sequences: the fluvial Jameco Gravel and marine Gardiners Clay; and the much more widespread Late Pleistocene glacial deposits of the Wisconsin glacial stage. Undifferentiated gravels and clays described in buried valleys within southern Long Island have been attributed to the Jameco Gravel and Gardiners Clay units. The Jameco Gravel and Gardiners Clay formations are well-defined, mapable stratigraphic units beneath the southern margin of Long Island where they are of hydrogeological significance. These stratigraphic units are not recognized in the vicinity of the Roosevelt site. The remainder of the Pleistocene succession belongs to the Wisconsin glacial stage Upper Glacial Deposits.

The thickness of the Pleistocene Upper Glacial Deposits in central Nassau County varies but averages 100 feet. The thickness and distribution of the Pleistocene Upper Glacial Deposits were controlled by the older, now buried paleotopography discussed above. The pattern of stream and river valleys that dissected the surface of Long Island during the Cenozoic likely was later modified by Pleistocene overriding ice sheets and meltwater erosion and deposition.

The Upper Pleistocene Upper Glacial Deposits in the Hempstead area rest on the irregular unconformity surface of the top-Magothy and are composed mainly of stratified beds of fine to coarse-grained sand and gravel; thin beds of silt and clay are interbedded with coarse-grained material (Krulikas 1987). These glaciofluvial deposits were laid down by meltwater streams on outwash plains and spillways during the advance, stagnation, and recession of the ice. Discontinuous bodies of silt and clay were deposited in glacial lakes.

The outwash that constitutes the bulk of the Upper Pleistocene deposits is yellow and brown, or, in some places, grey. The stratified sand and gravel consists mainly of iron-stained quartz but includes also igneous and metamorphic lithoclasts and heavy minerals.

### 3.1.3.2 Regional Hydrogeology

As implied above, the geometry of sedimentary units within the Coastal Plain varies greatly, and has significant hydrogeologic implications. For example, Upper Cretaceous sands may occur as fan-shaped deposits laid down in a fluvial setting; as elongate, sinuous, "shoe string" channels in deltaic settings; as coarse, thick, well-sorted linear accumulations in coastal dune complexes; or as thin, sheet-like bodies in shelf environments. These sandy deposits act as regionally or locally important water bearing zones, or aquifers. In contrast, the deposition of clay in the marine or glaciolacustrine environment (such as the Raritan Clay Member) typically occurs in low energy, protected sedimentary environments. Thus, clay beds are generally laterally continuous, and may drape over sand sheets and channel deposits and act as aquicludes. Along the fringes of clay beds, however, the clay may intermix with the surrounding coarser deposits.

The unconsolidated depositional units of Late Cretaceous to Pleistocene age which overlie the virtually impermeable basement bedrock constitute the wedge-shaped aquifer system underlying the Long Island Coastal Plain (Figure 3-3). The hydrogeologic nature of the sedimentary units primarily is determined by their texture and degree of sorting. Unconfined aquifers are recharged by infiltration in outcrop areas; confined aquifers are recharged by vertical leakage through overlying "leaky" confining units. Regional discharge is typically into streams and rivers (via upward leakage through confining units or confined aquifers), and ultimately to the Atlantic Ocean. In areas where confining units are regionally extensive, vertical components of flow are superimposed on horizontal components, thereby steepening hydraulic gradients. Confining units of small aerial extent do not significantly affect the regional flow.

Eight major hydrogeologic units have been identified beneath Long Island, from oldest to youngest: consolidated bedrock, the Lloyd aquifer, the Raritan confining unit, the Magothy aquifer, the Monmouth Greensand, the Jameco aquifer, the Gardiners Clay, and the Upper Glacial aquifer. Neither the Monmouth Greensand, Jameco aquifer, nor the Gardiners Clay have been identified within the Roosevelt site near Hempstead. The Lloyd aquifer unit is a confined aquifer subcropping over the entire island. The Magothy and Upper Glacial aquifers overlying the Raritan confining unit are found across most of Long Island and can be confined, semi-confined, and unconfined aquifers; combined, they are the most productive and heavily utilized groundwater resource on Long Island.

McClymonds and Franke (1972) compiled all available well data for the principal aquifer units (Lloyd, Magothy, and Upper Glacial) on Long Island to compare the average water-transmitting properties of the aquifers. The results of the study indicate that average transmissivities are highest for the Magothy aquifer (240,000 gallons per day per foot [gpd per ft]), 200,000 gpd per ft in the Upper Glacial aquifer, and lowest in the Lloyd (90,000 gpd per ft). Average hydraulic conductivities are highest in the Upper Glacial (1,700 gallons per day per square foot [gpd per sq ft]), 1,300 gpd per sq ft in the Magothy, and lowest in the Lloyd (360 gpd per sq ft).

The shallow unconfined watertable aquifer over most of Long Island is within the Upper Glacial aquifer unit. Groundwater movement can be deduced from water table contour maps, such as those by Franke and McClymonds (1972) and Krulikas (1987). In general, water north of the regional groundwater divide, which trends east-west along the island, moves northward towards Long Island Sound, and water south of the divide flows southward toward the Atlantic Ocean (Figure 3-6). The rate of horizontal flow in the Upper Glacial aquifer is controlled by the hydraulic gradient of the water table and by the water-transmitting characteristics of the aquifer material. Horizontal velocity in the upper glacial aquifer generally ranges from 1 to 2 feet/day; vertical flow is much slower, especially where confining layers restrict the upward or downward movement of water. Residence times in the Upper Glacial aquifer generally are less than 30 years (Franke and Cohen 1972). In general, groundwater flow in deeper aquifers is controlled by regional-scale flow systems.

Depth to groundwater on Long Island is less than 150 feet in most areas, ranging from zero feet along the shores and stream channels to greater than 250 feet in the extreme northwestern part of Suffolk County. The depth to groundwater primarily is determined by the island's glacial geology and associated topographic features, but also is affected by local and temporal variations in precipitation and groundwater withdrawals.

The water table is a subdued expression of the island's topography; thus, the depth to water generally is greater in the topographically high areas, such as those near the north shore and east-west trending glacial moraines that form the "spine" of the island, than in low-lying areas, such as stream valleys and most of the southern half of the island (Figure 3-7).

#### 3.1.3.3 Site-Specific Hydrogeology

Within the Roosevelt site, only the Lloyd, Magothy, and Upper Glacial aquifers have been recognized. This study is concerned only with the aquifer system above the Raritan Clay confining unit because site contamination is not suspected to have impacted the Lloyd confined aquifer. The following is a description of Magothy and Upper Glacial aquifer hydrogeology in the Roosevelt Field area, from data principally presented in Eckhardt and Pearsall (1989).

Overlying the Raritan, the Magothy is approximately 500 feet thick. Soil boring logs indicate that the succession is characterized by vertically-alternating parasequences and laterally-interfingering lithosomes of sand, clayey sand, sandy clay, lignite, and some gravel in the basal section. The deposits are fluvio-deltaic in origin and have considerable vertical and lateral heterogeneity. Discontinuous layers of grey lignitic clay are common in the upper zones of the Magothy, creating predominantly confined conditions in the deeper zones (Eckhardt and Pearsall 1989). The basal 150 feet of the Magothy are characterized by a sand- and gravel-rich lithology with hydraulic conductivities up to 190 feet per day (ft/d), compared with the upper zone of the Magothy which typically has average hydraulic conductivities of between 50 and 60 ft/d (McClymonds and Franke 1972). The public water supply wells in the site's vicinity, the two Village of Garden City wells at Roosevelt Field and the Town of Hempstead well field, extract water from this lower sand and gravel zone.

The Upper Glacial (water table) aquifer unconformably overlies the Magothy aquifer and consists of glacial outwash that is predominantly stratified sand and gravel. At the Roosevelt site, the outwash deposits are fairly uniform in grain size distribution and lithology. The water table ranges from 25 to 50 feet below ground surface (bgs). The hydraulic conductivity of the Upper Glacial aquifer in southern Nassau County averages about 250 ft/d (McClymonds and Franke 1972).

<u>Groundwater Flow</u>

Groundwater moves both horizontally and vertically from areas of high head to areas of low head along flow lines whose direction is normal to the contour lines constructed for the water table and the piezometric surfaces. The regional direction of groundwater movement at the Roosevelt site is southwest towards the discharge area at and beyond the south shore in southeastern Queens County and southwestern Nassau County (Donaldson and Koszalka 1983a, b, c). Horizontal flow velocities in the unconfined aquifer are about 1.0 ft/d (McClymonds and Franke 1972). The potentiometric surface of the Magothy aquifer in the site's vicinity is similar to that of the water table in the Upper Glacial aquifer when pumping wells are off, but heads in the Magothy are generally 1 to 2 feet lower than the water table, and flow is slightly more westward. Average horizontal flow rates for the Magothy are about 0.3 ft/d (Eckhardt and Pearsall 1989).

Eckhardt and Pearsall (1989) evaluated hydraulic head measurements in clusters of on-site wells with screens at different depths. The results of the study indicate there is a downward flow component beneath the entire Roosevelt Field area. Hydraulic heads in the middle and basal sections of the Magothy aquifer are lower than those in the Upper Glacial aquifer. The vertical hydraulic gradient increases during periods of peak water demand when the supply wells further depress hydraulic head in the Magothy. During March, 1983, the response to public supply well pumping of approximately one million gallons per day (mgd) at the two Garden City wells caused the potentiometric surface to fluctuate daily by about one foot.

Figure 3-8 illustrates the water table elevation for the Roosevelt site for 1984 (Eckhardt and Pearsall 1989). At that time, two Garden City supply wells and several cooling water wells were actively pumping water from the Magothy; the cooling water being used by the on-site office buildings in Garden City Plaza. The used cooling water was discharged to the Upper Glacial aquifer via the drain field west of Garden City Plaza and the Pembroke recharge basin immediately south of the office development. Groundwater pumping and discharge to the recharge basin are indicated on Figure 3-8 by the resultant depression of the water table around the cooling water wells at the Garden City Plaza office development and apparent mounding of the water table beneath the Pembroke basin. Subsequent to the mid 1980s, the cooling water wells ceased operation. Since pumping of the Magothy by cooling water wells and discharge to the Pembroke basin ceased, the flow in the water table aquifer has likely stabilized to reflect the regional hydraulic gradient. However, the effects of pumping the Magothy have likely continued in the vicinity of the two Village of Garden City municipal wells immediately west of the Pembroke basin and at the Village of Hempstead public supply well field located approximately 4,000 feet south (downgradient) from Roosevelt Field.

<u>Groundwater Recharge</u>

All of the groundwater on Long Island is derived from precipitation. The volume of water that percolates down to the water table and recharges the reservoir is the residual of the total precipitation not returned to the atmosphere by evapotranspiration or lost to the sea by runoff. Owing to the permeable nature of the surface soils and substrata and the generally gentle slope of the land surface, infiltration is high. The rate of natural recharge varies greatly from season to season and from year to year, depending on such factors as evapotranspiration, air and soil temperatures, soil-moisture conditions, and the nature and seasonal distribution of precipitation. At the Roosevelt site, which is mostly covered by impervious surfaces such as buildings, paved parking lots, and roads, surface runoff is directed to dry wells or the nearby recharge basins. Natural replenishment of the Magothy aquifer zones is achieved by downward movement of water from the shallow aquifer through discontinuities in clayey and silty beds.

### 3.1.4 Climate

The Village of Garden City in Hempstead Township is located on east-central Long Island, southeastern New York, where the climate is temperate maritime. Climate is more influenced by the ocean than by the adjacent mainland. It is characterized by mild winters and relatively cool summers, and is free from sudden or extreme changes in temperature (Warren, *et al.* 1968). The average annual temperature is about 51° F, the average January temperature is about 30° F, and the average July temperature is about 70° F. The maximum annual temperature is 95° F, and the minimum annual temperature is 0° F. The maximum and minimum observed temperatures are 102° F and -20° F. The growing season on Long Island is about 180-200 days, from the end of April to the end of October. During the average year, the percentage of possible sunshine ranges from about 50 percent in January to 65 percent in July and averages 62 percent during the growing season. The prevailing winds are from the west, shifting from the southwest in summer to the northwest in winter. Average wind speed is about 12 miles per hour.

Precipitation is the only source of freshwater for streams and groundwater in the Hempstead area. Average precipitation is about 42 inches per year; included within this value is an average annual snowfall of 25-30 inches, most of which falls between December and March (Miller and Frederick 1969). The greatest number of snow storms occur during February.

### 3.1.5 Population and Land Use

The Roosevelt site is located in a very densely developed portion of Nassau County, a mixed commercial-residential area, covering portions of the villages of Garden City and Hempstead within the Town of Hempstead. According to the Long Island Regional Planning Board (1982), based on census data from 1981, residential land accounted for 32% of the land area. The remaining land was described as undeveloped (27%); agricultural (8%), transportation, communication, and utilities (7%); institutional (5%); commercial (3%); and industrial (2%). Marine commercial land use area was negligible.

The former Roosevelt Field is characterized by commercial office development on the west (Garden City Plaza); a large regional shopping mall complex on the east (Roosevelt Field Shopping Center); an area occupied by undeveloped woodland, recharge basins, and Stewart Avenue School immediately south of the office park; and mixed retail/commercial businesses immediately south of the shopping mall. Immediately beyond Stewart Avenue is an area of retail strip development, commercial, and light industrial development. This area includes several state and federal hazardous waste sites that formerly released solvents to groundwater (the Pasley and Purex sites). Beyond that, to the south and south-southwest, land use is predominantly single family residential. Homes in this area of Garden City and

Hempstead use the municipal water supply pumped from village well fields for potable drinking water and the municipal sewer system for sanitary waste water disposal.

### 3.1.6 Characteristics of Chemical Contaminants

In 1982, the USGS, in collaboration with NCDH, performed a study to define the nature and extent of chlorinated VOCs at Roosevelt Field. The study was prompted by the discover y of chlorinated solvents (primarily TCE) in public supply wells in the site's vicinity in the late 1970s. A report describing the results of this study identified the distribution of contaminants in the Upper Glacial and Magothy aquifers but did not identify the source for the contamination; the source was unknown but suspected to be beneath an area where aircraft maintenance formerly occurred when the site was an active airfield more than 50 years ago. The summary of chemical contamination is based on the findings of the USGS report (Eckhardt and Pearsall 1989), the Hazard Ranking Report (Weston 2000), and more recent groundwater sampling data provided by NCDH.

Several rounds of cooling water well, monitoring well, and municipal supply well sampling have occurred since the late 1970s and early 1980s, conducted principally by the NCDH and NCDPW. Figure 3-8 illustrates the location of the wells previously sampled at the Roosevelt site as far downgradient as the Village of Hempstead public supply wells. These investigations revealed that both the Upper Glacial and Magothy aquifers have been impacted by contaminated groundwater with elevated concentrations of TCE, the principal VOC contaminant at the site. In 1984, TCE was detected in about half of the groundwater samples at the site. Other contaminants include associated chlorinated VOCs detected at lower concentrations, such as *cis*-1,2-dichloroethylene (DCE), PCE, and carbon tetrachloride (Appendix A).

The cooling water wells may have been plugged and abandoned. Recent site visits indicate that the majority of the former on-site cooling water and monitoring wells have been paved over or will require further site reconnaissance to locate. There are approximately 30 municipal supply wells within the Roosevelt site's vicinity that remain active and have been sampled regularly from the early 1980s to the present. Figure 3-9 illustrates public supply wells within a one-mile radius of the site, including the Village of Garden City wells N3934 and N3935 (also labeled wells 10 and 11) at Roosevelt Field and the Village of Hempstead well field approximately 4,000 feet downgradient of the mall area.

Other VOCs not associated with chlorinated solvents have been detected throughout the study area, commonly occurring in isolated areas and include elevated detections of gasoline products and other solvents.

Eckhardt and Pearsall (1989) presented the result of the sampling for inorganic chemical characteristics of 105 wells screened in the Upper Glacial and Magothy aquifers in 1984. In general, the concentrations of inorganic analytes in the two aquifers at locations impacted by the VOC contamination were similar to those detected in the surrounding ambient groundwater (Eckhardt and Pearsall 1989, Table 3).

## Sources and Distribution of Contamination

The primary contaminant at the Roosevelt site is TCE, although PCE and DCE are frequently found at lower concentrations. Eckhardt and Pearsall (1989) defined three contaminant plumes at the site: a plume suspected to be the original plume, presumed to be the result of solvent releases to the ground during the former aircraft maintenance activities; a second plume created during discharge of spent contaminated cooling water to a drain field formerly located west of 100 and 200 Garden City Plaza (Figure 2-2); and a third plume created by discharge of contaminated cooling water to the Pembrook recharge basin.

The original TCE plume is thought to originate from an area upgradient of contaminated former cooling water wells, located just north of 100 Garden City Plaza and the drain field. Chlorinated solvents thought to be associated with this plume have been detected in both the Upper Glacial and Magothy aquifers. The original plume moved south-southwestward horizontally downgradient in the Upper Glacial aquifer and downward into the Magothy aquifer. In 1984, its extent in the shallower aquifer was obscured by the overlying plumes of contaminated cooling water discharge.

The second TCE plume was identified originating from the discharge of cooling water pumped from Magothy wells N9310 and N9311 at 100 Garden City Plaza. The plume contained VOCs at concentrations up to 1,000 µg/L after treatment with aeration. A delineation of the plume in 1982 indicated that it extended radially in the Upper Glacial aquifer around the drain field, reflecting the radial flow caused by the groundwater mound created by the drain field.

The third TCE plume, originating from the Pembrook recharge basin, was identified overlying the two other plumes that originated further upgradient. Contaminated groundwater from the original plume in the Magothy aquifer was pumped by cooling water wells N5507, N6045, N8050, and N8458 during warm weather. Storm runoff relatively free of VOCs was also discharged to the recharge basin, diluting the contaminated cooling water. As a result, concentrations of VOCs in the basin and plume decreased during winter and spring when the cooling water wells were inactive and only storm water entered the basin. Mounding of the water table below the basin caused a reversal of the regional hydraulic gradient of the water table and resulted in the delayed seasonal appearance of TCE in Upper Glacial aquifer monitoring wells. The downgradient extent of elevated concentrations of TCE in the Upper Glacial aquifer in 1984 was 94 µg/L at well N10205 (0.5 mile downgradient), and below detection limits at N9398 (about one mile further downgradient).

The two discharge plumes differed in that the discharge from the Pembrook recharge basin contained TCE, PCE, and DCE, whereas the discharge from the drain field contained only TCE and DCE. Thus, it was possible to distinguish the downgradient extent of the two plumes. The plumes merged west of the recharge basin, impacting the Village of Garden City public supply wells 10 and 11, screened in the Magothy aquifer.

<u>*Distribution of VOCs in the Upper Glacial Aquifer*</u>

At least 43 monitoring wells screened in the Upper Glacial aquifer and four monitoring wells screened in the Magothy were installed at the Roosevelt Field site in the early 1980s. Most of the shallow monitoring wells screened in the Upper Glacial were sampled periodically until 1984; almost all samples collected from these wells contained chlorinated VOCs. TCE and PCE were detected in almost all of these wells; the highest concentrations were found in monitoring well N9973, in the area of the former drain field west of 200 Garden City Plaza and in well N10096, immediately north of the Pembrook Basin, at concentrations up to 750 µg/L and 550 µg/L, respectively. DCE was detected in about half of the monitoring wells at concentrations up to 170 µg/L in well N9965, located in the former Garden City Plaza drain field.

Seasonal groundwater data collected during the mid 1980s were used to compare the aerial extent of the merged TCE discharge plumes in the Upper Glacial aquifer during a period of heavy cooling-water pumping (Figure 3-10a) and at a time prior to seasonal cooling-water pumping (Figure 3-10b). Although the plumes are essentially the same, the most noticeable difference is that the concentrations of TCE at the drain field and recharge basin were significantly lower during the cooler seasons as a result of recharge with TCE-free storm runoff, which displaced the TCE-contaminated water discharged during the previous summer.

Notably, at the time the USGS report was published in 1989, the federal Maximum Contaminant Level (MCL) for TCE was 50 µg/L; the current MCL is 5 µg/L. Consequently, if the area of Upper Glacial aquifer plumes in Figure 3-10a and 10b included the aerial extent of the 5-50 µg/L plume, a much wider area would be depicted.

<u>*Distribution of VOCs in the Magothy Aquifer*</u>

Figure 3-10c presents the distribution of VOCs in the Magothy aquifer at Roosevelt Field based upon 1984 sampling data (Eckhardt and Pearsall 1989). The small aerial extent of the TCE plume is partly a reflection of the relatively few wells that were sampled (four monitoring wells, nine cooling water wells, and two supply wells). In addition, the greater thickness and heterogeneity of the Magothy aquifer compared with the Upper Glacial aquifer make it more difficult to accurately define the plume geometry. As mentioned above, the 5-50 µg/L plume concentration is not depicted on this figure; it would define a larger area exceeding the current TCE MCL.

Two of the four monitoring wells screened in the Magothy (wells N9703 and N9713) were located on Stewart Avenue southwest of the Roosevelt Field property and were sampled in 1984 (Figure 3-8); the two other monitoring wells (N10019 and N10020) were located on the southwest and southeast corners, respectively, of Garden City Plaza. These latter wells were sampled from the early 1980s through 1996. No VOCs were detected in the sample from monitoring well N9713. VOCs were detected in the other three Magothy monitoring wells; the highest concentrations of TCE, PCE, and DCE were detected in the 1987 sample collected from monitoring well N10020 (at 523 µg/L, 174 µg/L, and 309 µg/L, respectively).

The highest TCE contamination detected in cooling water samples collected from the Magothy plume at depths between 200 and 350 feet bgs were 38,000 µg/L at N8050 (the maximum recorded contaminant concentration in site wells), 1,300 µg/L at N9310, and 550 µg/L at N9311. TCE concentrations in well N8050 ranged from 13,000 to 38,000 µg/L in 1983 and 1984 (Eckhardt and Pearsall 1989); the well was closed in the late 1980s, but not abandoned. These concentrations are considered to be highly suggestive of the presence of dense non-aqueous phase liquid (DNAPL), as they exceed 1% of the aqueous solubility (1,100 µg/L) of TCE (Weston 2000).

Geophysical and lithological logs of the Magothy aquifer from N5486, a former supply well in the vicinity of the original Upper Glacial plume, indicated an absence of clay layers throughout the 511-foot thickness of the Magothy at that location (Figure 3-8). The lack of confining layers in the vicinity of the source area would provide a favorable pathway for the downward movement of non-aqueous phase chlorinated VOCs from the Upper Glacial aquifer to the deeper zones in the Magothy aquifer.

PCE also was detected in about half of the site cooling water wells in 1984, up to 350 µg/L in abandoned cooling water well N5507, located at the shopping center. DCE was detected in about a quarter of the site wells, up to 2,800 µg/L, in cooling water well N8050.

Another cooling water well, N5507, located 1,000 feet southeast of N8050, contained 440 µg/L of TCE and 140 µg/L of PCE in 1984; this could suggest there was another source of contamination hydraulically upgradient of N5507, possibly associated with the location of former Navy hangars immediately south of Old Country Road east of the mall. There are little other data for the Magothy for this area of the site, except for cooling water wells N10076, N6841, and N6842 screened between 207 and 334 feet bgs, 312 and 337 feet bgs, and 143 and 158 feet bgs, respectively. These wells are located at what would have been close to the eastern end (cross-gradient) of the large hangars occupied by the Navy for aircraft repair and construction between 1942 and 1946 (Figures 2-2 and 3-10). Eckhardt and Pearsall (1989) reported results of TCE analyses during early 1980s sampling of N10076, N6841, and N6842 of 2 µg/L, below detection limits, and 5 µg/L, respectively. N6842 also contained an number of other VOCs not defined in Eckhardt and Pearsall (1989).

Analytical data for approximately 30 public supply wells in the study area indicate the Magothy aquifer in which each is screened has been impacted by chlorinated solvents within the Roosevelt site (data compiled from Eckhardt and Pearsall [1989] and water supply well test results [through 2000] provided by the Water Supply Protection Division of NCDH). At Roosevelt Field, public supply wells N3934 and N3935 (Garden City wells 10 and 11) have been sampled on a regular basis since the late 1970s to present; both wells are screened in the Magothy at depths of 377-417 and 370-410 feet bgs, respectively. These wells are the most heavily VOC-contaminated public wells within the Roosevelt site that remain in service; each currently is served by a dedicated air stripper (Weston 2000). Both wells have been impacted with TCE and DCE up to 710 µg/L and 63 µg/L, respectively, and with PCE up to 1,100 µg/L. The highest sample concentrations obtained from these wells to date were recorded during the mid to late 1990s, in 1993 and 1998. Between 1977 and 2000, carbon tetrachloride also was detected at concentrations between 0.5 and 8.7 µg/L; the highest concentration was detected in 1999.

Two Town of Hempstead wells formerly located on the Roosevelt Field site (wells N5484 and N5485) were abandoned in the early 1990s after they were found to contain consistently-elevated levels of TCE throughout sampling during the 1980s.

Village of Hempstead public supply wells, approximately 4,000 feet to the south-southwest (hydraulically downgradient) of the Roosevelt Field source area, also have been monitored for VOCs. As of 2000, two of the seven supply wells at the Hempstead water supply well field were affected by chlorinated VOC contamination - wells N83 and N4425. Only TCE and PCE were consistently detected in these wells, at concentrations up to 29 µg/L and 79 µg/L, respectively. The majority of the remaining downgradient supply wells had not been affected by chlorinated solvent contamination during regular sampling conducted by the NCDH (up to 2000). At present, the Village of Hempstead supply wells affected by VOC contamination approximate the southerly (downgradient) extent of groundwater contamination within the Roosevelt site.

In general, dissolved phase VOC-contaminated water in the Magothy has been transported south-southwest along regional flow lines. Regional horizontal groundwater flow rates in the Magothy aquifer are less than one-third those in the Upper Glacial aquifer; vertical flow rates are significantly lower owing to the anisotropy of the Magothy (controlled by the heterogeneous nature of its geology). Seasonal pumping of the Magothy, from the 1970s through much of the 1980s, by the cooling water wells (screened at less than 330 feet bgs) and pumping by the Village of Garden City public supply wells (screened deeper than 370 feet bgs) may have reversed the regional hydraulic gradient near these pumping centers, thereby retarding south-southwestward plume migration. Since the cooling water wells at Roosevelt Field ceased operation at some time in the mid-1980s, it is likely that the plume in the Magothy has migrated beyond the influence of the Garden City supply wells along the regional flow gradient towards the south-southwest.

### 3.1.7 Site Conceptual Model

Physical Setting with Respect to Groundwater Movement

The Roosevelt site is located within the Atlantic Coastal Plain Physiographic Province. The geology of Long Island is characterized by a southeastward-thickening wedge of unconsolidated sediments unconformably overlying a gently-dipping basement bedrock surface. The sedimentary wedge in the vicinity of the Roosevelt site thickens from about 800 feet at the northern edge of the Town of Hempstead to approximately 1,500 feet thick beneath the barrier islands. Major sedimentary units include, from oldest to youngest, the Raritan Formation (which includes the Lloyd aquifer and the Raritan Clay), the Magothy Formation, and glacial deposits. Eight major hydrogeologic units have been identified beneath Long Island, from oldest to youngest: consolidated bedrock, the Lloyd aquifer, the Raritan confining unit, the

Magothy aquifer, the Monmouth Greensand, the Jameco aquifer, the Gardiners Clay, and the Upper Glacial aquifer.

At the Roosevelt site, the majority of supply wells are screened in the Magothy, which is approximately 500 feet thick and consists of interbedded sands, clayey sands, sandy clay, silts, and gravel. The Upper Glacial (water table) aquifer unconformably overlies the Magothy and consists of uniform glacial outwash deposits that are predominantly stratified sand and gravel. The water table ranges from 25 to 50 feet bgs.

Groundwater flow is to the south/southwest, toward the south shore of Long Island. Horizontal flow velocities in the unconfined water table aquifer are about 1.0 ft/d (McClymonds and Franke 1972). The potentiometric surface of the Magothy aquifer in the site's vicinity is similar to that of the water table in the Upper Glacial aquifer when pumping wells are off, but heads in the Magothy are generally 1 to 2 feet lower than the water table, and flow is slightly more westward. Average horizontal flow rates for the Magothy are about 0.3 ft/d (Eckhardt and Pearsall 1989).

All of the groundwater on Long Island is derived from precipitation. The volume of water that percolates down to the water table and recharges the reservoir is the residual of the total precipitation not returned to the atmosphere by evapotranspiration or lost to the sea by runoff. The sandy nature of the surface and subsurface soils results in a high rate of infiltration. At the Roosevelt site, which is mostly covered by impervious surfaces such as buildings, paved parking lots, and roads, surface runoff is directed to dry wells or the nearby recharge basins. Natural replenishment of the Magothy aquifer is achieved by downward movement of water from the shallow aquifer through the sandy layers.

<u>Potential Contaminant Sources to Groundwater</u>

From the early parts of the twentieth century until 1951, the Roosevelt Field airfield was an active facility with runways, hangars, and air craft maintenance and repair shops. Buildings were apparently concentrated along both Old Country Road and Clinton Road. Solvents such as TCE and PCE came into use for cleaning, degreasing, and deicing in the late 1930s. It is suspected that chlorinated solvents were used for a variety of purposes around the air field complex. At the time, the common disposal method of used and/or spent solvents was direct discharge to the ground surface. It is unknown if solvents were discharged to the ground at centralized disposal areas, or discharged at the most convenient location at any given time. Historical aerial photographs of the air field facility have not been assessed, to determine if centralized disposal areas are evident. It is presumed that ground disposal of solvents most likely occurred close to hangars where aircraft maintenance was performed. Numerous discharge areas may have been used while the airfield was active.

<u>Expected Transport and Fate of Site Contaminants</u>

*Groundwater*

Liquid chlorinated solvents discharged directly to the ground surface would be expected to migrate downward through the unsaturated zone in a relatively linear pattern, with minimal dispersion from the discharge location (Figure 3-11). The unsaturated zone at the Roosevelt site is primarily sandy material, so complex migration pathways along lower permeability zones is not expected. The unsaturated zone is approximately 25-40 feet thick.

Once liquid chlorinated solvent (TCE and PCE) encounters the water table, some of the solvent will become dissolved in the groundwater and begin to move in the direction of groundwater flow. If the quantity of solvent reaching the water table is sufficient, some of the solvent will remain in an undissolved state as a DNAPL and, since TCE and PCE are denser than water, the solvent will continue to move downward under the influence of gravity. DNAPL will continue to sink until it encounters a lower permeability zone, which would slow or stop the downward migration. DNAPL could pool or accumulate on top of a lower permeability zone and remain stationary or move in the down-slope direction of the lower permeability zone. If sufficient DNAPL is pooled or trapped in the aquifer, it will act as a continual source of dissolved groundwater contamination. Movement of DNAPL in the saturated zone can be very complex, with movement controlled by the permeability of subsurface stratigraphic units, the shape and configuration of lower permeability zones, and/or the dip of bedding planes.

At the Roosevelt site, groundwater generally flows toward the south/southwest. However, movement of TCE and PCE in the saturated zone at the Roosevelt site has been complicated by the extensive groundwater extraction that has occurred in the area from several types of wells. Garden City supply wells 10 and 11 were put on line in the early 1950s, just after the Roosevelt Field airfield closed. Records for these wells indicate that at peak demand each well pumps about one mgd, with average demand about 0.65 mgd. The supply wells are screened from 377-417 feet bgs and 370-410 feet bgs, respectively, in the Magothy Formation. In addition to the Garden City supply wells, seven cooling water wells pumped groundwater from the Magothy for use in building air conditioning systems. Cooling water wells pumped variable amounts of water, with greater extraction rates during the hot summer months. These wells operated from about 1960 to about 1985. After extracted groundwater was used in building air conditioning systems, the untreated water was returned to the aquifer system via surface recharge in the Pembrook recharge basin at the southern end of the Roosevelt Field mall/office complex or, after minimal treatment, a drain field west of Buildings 100 and 200. Surface discharge of contaminated groundwater spread contamination through the Upper Glacial and Magothy aquifers. The recharge basin and drain field also created localized groundwater mounding, which further spread contamination at the water table (Figure 3-11).

The discharge of contaminated water into the recharge basin and leaching field ceased in about 1985 when the cooling water wells were taken out of service. The Pembrook recharge basin currently only receives surficial stormwater runoff from parking lots surrounding the mall and the office buildings. The leaching field near Building 100 is under the paved parking lot west of Building 100 and 200 and is not currently identifiable in the field.

Chlorinated solvents (such as TCE and PCE in a dissolved phase) move with the groundwater flow, but generally at a slower rate than groundwater. If disposal of TCE and/or PCE near well N8050 is assumed to have begun in 1945, at an estimated flow rate of 1 ft/d for the Upper Glacial and 0.3 ft/d for the Magothy, in 55 years contaminated groundwater would have migrated about 20,000 feet or 3.5 miles in the Upper Glacial and about 6,000 feet or about one mile in the Magothy. However, pumping of the Garden City supply wells 10 and 11 and the air conditioning cooling wells, probably slowed the movement of contaminants by altering the natural movement of groundwater.

Natural attenuation of chlorinated solvents is a documented process, with PCE and TCE breaking down through a known decay chain of compounds. Some of these daughter compounds (e.g., DCE) have been detected within the complex Roosevelt plume, so natural attenuation processes may be occurring in the groundwater. An assessment of natural attenuation potential will be conducted as part of the RI/FS.

*Air*

If chlorinated VOCs are present in the groundwater at the surface of the water table, VOCs may volatilize into the unsaturated zone and move upwards towards the ground surface. If VOC levels are high enough, they may penetrate into building substructures such as basements that extend into the subsurface. VOCs that originated in the groundwater and migrate into building substructures could cause exposure to human receptors of VOCs, through the inhalation pathway.

## 3.2 Preliminary Identification of Applicable or Relevant and Appropriate Requirements

This section provides a preliminary determination of the regulations that are applicable or relevant and appropriate to groundwater remediation at the Roosevelt site. Both federal and state environmental and public health requirements are considered. In addition, this section presents an identification of federal and state criteria, advisories, and guidance that could be used to evaluate remedial alternatives. Only the regulations that are considered relevant to the site are presented.

### 3.2.1 Definition of ARARs

The legal requirements that are relevant to the remediation of the site are identified and discussed using the framework and terminology of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). These acts specify that Superfund remedial actions must comply with the requirements and standards of both federal and state environmental laws.

The EPA defines applicable requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site." An applicable requirement must directly and fully address the situation at the site.

The EPA defines relevant and appropriate requirements as "those cleanup standards, standards of control, or other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

Remedial actions must comply with state ARARs that are more stringent than federal ARARs. State ARARs are also used in the absence of a federal ARAR, or where a state ARAR is broader in scope than the federal ARAR. In order to qualify as an ARAR, state requirements must be promulgated and identified in a timely manner. Furthermore, for a state requirement to be a potential ARAR it must be applicable to all remedial situations described in the requirement, not just CERCLA sites.

ARARs are not currently available for every chemical, location, or action that may be encountered. For example, no ARARs currently specify clean-up levels for soils. When ARARs are not available, remediation goals may be based upon other federal or state criteria, advisories and guidance, or local ordinances. In the development of remedial action alternatives the information derived from these sources is termed "To Be Considered" and the resulting requirements are referred to as TBCs. EPA guidance allows clean-up goals to be based upon non-promulgated criteria and advisories such as reference doses when ARARs do not exist, or when an ARAR alone would not be sufficiently protective in the given circumstance.

By contrast, there are six conditions under which compliance with ARARs may be waived. Remedial actions performed under Superfund authority must comply with ARARS except in the following circumstances: (1) the remedial action is an interim measure or a portion of the total remedy which will attain the standard upon completion; (2) compliance with the requirement could result in greater risk to human health and the environment than alternative options; (3) compliance is technically impractical from an engineering perspective; (4) the remedial action will attain an equivalent standard of performance; (5) the requirement has been promulgated by the state, but has not been consistently applied in similar circumstances; or (6) the remedial action would disrupt fund balancing.

Potential ARARs and TBCs are classified as chemical, action, or location specific, as described below.

- Chemical-specific ARARs or TBCs are usually health or risk-based numerical values, or methodologies which, when applied to site specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

- Location-specific ARARs or TBCs generally are restrictions imposed when remedial activities are performed in an environmentally sensitive area or special location. Some examples of special locations include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

- Action-specific ARARs or TBCs are restrictions placed on particular treatment or disposal technologies. Examples of action-specific ARARs are effluent discharge limits and hazardous waste manifest requirements.

## 3.2.2 Preliminary Identification of ARARs and TBCs

The identification of ARARs occurs at various points during the RI/FS and throughout the remedial process. ARARs are used to determine the extent of cleanup, to scope and formulate remedial action alternatives, and to govern the implementation of the selected alternative.

The following are preliminary ARARs that may impact the selection of remedial alternatives for various environmental media at the site. This preliminary list of ARARs is based on current site knowledge and will be reviewed and updated during the RI/FS process. Periodic review of the preliminary list of ARARs will assure that the ARARs remain applicable, as more site-specific information becomes available, and as new or revised ARARs are established.

### 3.2.2.1 Chemical-Specific ARARs

The determination of potential chemical-specific ARARs and TBC criteria for a site typically follows an examination of the nature and extent of contamination, potential migration pathways and release mechanisms for site contaminants, the presence of human receptor populations, and the likelihood that exposure to site contaminants will occur. Previous investigations did not provide sufficient information to meet the above criteria, therefore, the potential chemical-specific ARARs are as follows:

Federal

- Resource Conservation and Recovery Act (RCRA) Groundwater Protection Standards and Maximum Concentration Limits (40 Code of Federal Regulations (CFR) 264, Subpart F)
- Clean Water Act, Water Quality Criteria (Section 304) (May 1, 1987 - Gold Book)
- Safe Drinking Water Act, MCLs (40 CFR 141.11-.16)

New York

- New York Ground Water Quality Regulations (6 New York Code of Requirements and Regulations [NYCRR] Part 703)
- New York State Department of Health, State Sanitary Code, Drinking Water Supply (10 NYCRR Part 5.1)
- New York Surface Water Quality Standards (6 NYCRR Part 702)
- New York Water Supply Sources (10 NYCRR Part 170)
- New York Pollution Discharge Elimination Systems (6 NYCRR Part 750-758)
- New York Technical and Operations Guidance Series (TOGS), Ambient Water Quality Standards and Guidance Values (April 1, 1987)

#### 3.2.2.2 Location-Specific ARARs

The location of the site is a fundamental determinant of its impact of human health and the environment. Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in a specific location (EPA 1988). Some examples of these unique locations include: flood plains, wetlands, historic places, and sensitive ecosystems or habitats, therefore the potential location-specific ARARs are as follows:

<u>Federal</u>

- Endangered Species Act of 1973 (16 United States Code (USC) 1531)
- National Historic Preservation Act (16 USC 470) Section 106 *et seq.* (36 CFR 800)
- RCRA Location Requirements for 100-year Flood plains (40 CFR 264.18(b))

<u>New York</u>

- New York Use and Protection of Waters (6 NYCRR Part 608)
- Endangered and Threatened Species of Fish and Wildlife (6 NYCRR Part 182)

#### 3.2.2.3 Action-Specific ARARs

Based on the identification of remedial response objectives and applicable general response actions, numerous federally promulgated action-specific ARARs and TBCs will affect the implementation of remedial measures and include administrative requirements related to treatment, storage and disposal actions.

The primary federal requirements which guide remediation are those established under CERCLA as amended by SARA. The National Contingency Plan (NCP) incorporates the SARA Title III requirement that alternatives must satisfy ARARs and utilize technologies that will provide a permanent reduction in the toxicity, mobility or volume of wastes, to the extent practicable.

RCRA establishes both administrative (e.g., permitting, manifesting) requirements and substantive (i.e., design and operation) requirements for remedial actions. For all CERCLA actions conducted entirely onsite, only the substantive requirements apply. NYSDEC has promulgated several regulations relating to alternatives which involve the treatment, storage, disposal, or transportation of hazardous wastes including the NYSDEC Hazardous Waste Management and Facility Regulations. Portions of the NYSDEC hazardous waste regulations are more stringent than the federal counterparts. The potentially applicable action-specific ARARs are as follows:

<u>Federal</u>

- RCRA Subtitle C Hazardous Waste Treatment Facility Design and Operating Standards for Treatment and Disposal Systems (i.e., landfill, incinerators, tanks, containers) (40 CFR 264 and 265) (Minimum Technology Requirements)
- RCRA Subtitle C Closure and Post-Closure Standards (40 CFR 264, Subpart G)
- RCRA Ground Water Monitoring and Protection Standards (40 CFR 264, Subpart F)
- RCRA Manifesting, Transport and Record keeping Requirements (40 CFR 262)
- RCRA Wastewater Treatment System Standards (40 CFR 264, Subpart X)

- RCRA Storage Requirements (40 CFR 264; 40 CFR 265, Subparts I and J)
- RCRA Subtitle D Nonhazardous Waste Management Standards (40 CFR 257)
- RCRA Excavation and Fugitive Dust Requirements (40 CFR 264.251 and 264.254)
- Off-Site Transport of Hazardous Waste (EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9834.11)
- Safe Drinking Water Act, Underground Injection Control Requirements (40 CFR 144 and 146)
- Clean Water Act - National Pollution Discharge Elimination Systems (NPDES) Permitting Requirements for Discharge of Treatment System Effluent (40 CFR 122-125)
- Clean Water Act Discharge to Publicly Owned Treatment Works (POTW) (40 CFR 403)
- National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 61)
- Department of Transportation (DOT) Rules for Hazardous Materials Transport (49 CFR 107,171.1-171.500)
- Occupational Safety and Health Standards for Hazardous Responses and General Construction Activities (29 CFR 1904,1910,1926)

<u>New York</u>

- New York State Solid Waste Management Facilities (6 NYCRR Part 360)
- New York State Siting of Industrial Hazardous Waste Facilities (6 NYCRR Part 361)
- New York State Waste Transporter Permits(6 NYCRR Part 364)
- New York State Hazardous Waste Management System (6 NYCRR Part 370)
- New York State Identification and Listing of Hazardous Wastes (6 NYCRR Part 371)
- New York State Hazardous Waste Manifest System and related Standards for Generators, Transporters and Facilities (6 NYCRR Part 372)
- New York State Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements (6 NYCRR Part 373-1)
- New York State Final Status Standard for Owners and Operators of Hazardous Waste TSD Facilities (6 NYCRR Part 373-2)
- New York State Interim Status Standards for Owners and Operators of Hazardous Waste Facilities (6 NYCRR Part 373-3)
- New York State Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Management Facilities (6 NYCRR Part 374)
- New York State Inactive Hazardous Waste Disposal Sites (6 NYCRR Part 375)
- New York State Uniform Procedures (6 NYCRR Part 621)
- New York State Permit Hearing Procedures (6 NYCRR Part 624)
- Implementation of NPDES Program in NYS (6 NYCRR Part 750-757)
- Division of Air, General Provisions (6 NYCRR Part 200)
- Air Permits and Certifications (6 NYCRR Part 201)
- General Prohibitions (6 NYCRR Part 211)
- General Process Emission Sources (6 NYCRR Part 212)
- New York Water Pollution Control Regulations (6 NYCRR Parts 608,610-614)

- NYSDOH Organic Chemical Action Steps for Drinking Water (NYSDOH PWS 69)
- NYSDOH Point-of-Use Activated Carbon Treatment Systems

#### 3.2.2.4 TBCs

When ARARs do not exist for a particular chemical or remedial activity, other criteria, advisories and guidance (TBCs) may be useful in designing and selecting a remedial alternative. The following criteria, advisories and guidance were developed by EPA, other federal agencies and state agencies. The potentially applicable federal and state TBCs are as follows:

Federal TBCs (Action-, Location-, and Chemical-Specific)

- Safe Drinking Water Act National Primary Drinking Water Regulations, Maximum Contaminant Level Goals (MCLGs)
- Maximum Contaminant Levels Goals (56 CFR 3256, January 30, 1991, 50 Federal Register 46936-47022, November 13, 1985)
- National Recommended Water Quality Criteria, EPA, 1999)
- Clean Water Act, Water Quality Criteria (Section 304) (May 1, 1987 - Gold Book)
- EPA Drinking Water Health Advisories
- EPA Health Effects Assessment (HEAs)
- TSCA Health Data
- Toxicological Profiles, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service
- Policy for the Development of Water-Quality-Based Permit Limitations for Toxic Pollutants (49 Federal Register 8711)
- Cancer Assessment Group (National Academy of Science) Guidance
- Ground Water Classification Guidelines
- Ground Water Protection Strategy
- Waste Load Allocation Procedures
- Fish and Wildlife Coordination Act Advisories

New York TBCs (Action, Location, and Chemical-Specific)

- Technical and Operations Guidance Series
  - Analytical Detectability for Toxic Pollutants, July 12, 1985
  - Ambient Water Quality Standards and Guidance Values, June 1998
  - Toxicity Testing in the SPDES Permit Program, April 1, 1987
  - BPJ Methodologies, April 1, 1987
  - Regional Authorization for Temporary Discharges, April 1, 1987
  - Underground Injection/recirculation at Groundwater Remediation Sites, April 1, 1987
  - Industrial SPDES Permit Drafting Strategy for Surface Waters, May 19, 1987
  - Waste Assimilative Capacity analysis for Setting Water Quality Based Effluent Limits, May 22, 1987
- Technical and Administrative Guidance Memorandum (TAGM) 4046: Recommended Soil Cleanup Objectives
- NYSDOH Tetrachloroethene Air Criteria Document

- NYSDOH Generic Community Air Monitoring Plan
- Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants

## 3.3 Preliminary Human Health Risk Assessment

The preliminary human health risk assessment (HHRA) for the Roosevelt site, presented below, is based on historical site information and available analytical results for groundwater and soil gas investigations.

Chemicals of potential concern (COPCs), source areas and release mechanisms, exposure pathways and receptors, and additional data needs are discussed in the following subsections.

### 3.3.1 Potential Chemicals of Concern

VOCs, in particular TCE, DCE, PCE, and carbon tetrachloride, have been detected in groundwater samples at concentrations exceeding state and federal drinking water standards. A full screening of the RI data to select COPCs will be conducted as part of the human health risk assessment using criteria outlined in Section 5.7.

### 3.3.2 Potential Source Areas and Exposure Pathways

Eckhardt and Pearsall (1989) identified three plumes of VOC contamination at the Roosevelt site: the original plume in the Magothy aquifer, and two plumes in the Upper Glacial aquifer.

No contaminated soil source areas are associated with these plumes. The original source of the contamination in the Magothy aquifer has not been identified. It is possible that the contamination occurred from surface disposal of chemicals when the air field was in operation. However, subsequent demolition and construction activities at the property over the past 50 years have involved significant earth movement, and any historical hot spots of surface contamination that might have existed will no longer be present.

The Upper Glacial aquifer plumes were formed when contaminated Magothy aquifer water was used as cooling water and subsequently discharged to the surface in the Pembrook recharge basin and the drain field (Figure 3-11). This discharge stopped in the mid-1980s. While some soil contamination may have occurred during water discharge at these points, any VOCs that might have bound to the soil are likely to have volatilized by now.

The former air field is currently the site of a large shopping mall and office-building complex and is surrounded by residential and commercial areas and light industry. Based on this land use, the populations that could be exposed to site-related contamination (i.e., the potential receptors) include residents, workers, and visitors to the mall and commercial areas.

Pathways of potential concern at the site have been identified and are presented below.

#### 3.3.2.1 Groundwater Pathway

Groundwater associated with the site is of concern because available analytical data indicate that several volatile organic compounds, including TCE, PCE and DCE, are present at concentrations above New York State and federal MCLs. Exposure to contaminants in groundwater could occur either through direct use of the groundwater or through migration of contaminants from the groundwater to air that is then inhaled.

While migration of VOCs from groundwater through the soil column (in soil gas) and into ambient or indoor air is possible, exposures via this pathway are expected to be negligible, especially in comparison to direct use of the groundwater. The water table is located approximately 25 to 50 feet bgs. No VOCs were detected in soil gas measurements collected during the 1993 soil gas survey at the Stewart Avenue School (Holzmacher, McLendon & Murrell 1993). However, if chlorinated VOCs are identified during groundwater screening at the top of the water table, vapor samples will be collected underneath the lowest points of the basements at 100 and 200 Garden City Plaza. It should be noted that the basements of these buildings are used for building maintenance activities, including three large oil-fired boilers for heating four commercial office buildings (100, 200, 300 and 400 Garden City Plaza).

Direct use of the groundwater is possible. Nassau County does not permit installation of private wells for areas supplied by public water (Article 4, Public Health Ordinance), but the area is served by municipal water supplies that draw on the contaminated portion of the Magothy aquifer. The Garden City public supply wells 10 (N3934) and 11 (N3935) are located at the southwestern corner of the former airfield property, approximately 2,000 feet south-southeast of the well with the highest historical contaminant levels (cooling water well N8050). Together, the two public supply wells serve about 6,860 people. In addition, the Village of Hempstead water supply well field is located approximately 4,000 ft downgradient of the former air field property and also draws water from the Magothy aquifer. VOCs have been detected in two of the seven wells in the Village of Hempstead well field. The municipalities treat water from both well fields before distribution.

Based on the above considerations, no complete groundwater exposure pathways currently exist. However, if the municipalities removed the treatment systems or if those systems failed, the most likely future receptors for site-related contamination are any users of municipal water supply wells that draw from the contaminated zone of the aquifer. Such users could include the local residents, workers, and visitors. Of these potential receptors, residents who use the water for drinking water, showering/bathing, and other household uses would have the greatest exposure.

The risk assessment will evaluate potential future exposures to groundwater used as drinking water by residents, assuming that residents may be exposed to contaminants in groundwater via ingestion and during showering via dermal contact and inhalation of volatile compounds. If data suggest the potential for a complete exposure pathway to indoor air vapors from site groundwater-generated vapors migrating upward into building basements, the risk assessment will evaluate this pathway.

### 3.3.3 Summary of Additional Data Needs

Previous investigations of the site have not provided sufficient environmental sampling data to characterize the potential risks to human receptors. Additional data will be collected during the RI for use in the baseline human health risk assessment.

## 3.4 Preliminary Ecological Risk Assessment

The majority of the Roosevelt site is developed land, with a large shopping mall and office building complexes surrounded by asphalt parking lots. Part of the site is a highly developed residential area. The residents are served by several public water supply wells. Two recharge basins are present near Garden City supply wells 10 and 11; these basins receive surface runoff during storm events. The site is unlikely to contain natural habitats for threatened or endangered species. However, an ecological investigation will be included as an optional task.

## 3.5 Preliminary Identification of Remedial Action Alternatives

The groundwater at the site is a source of drinking water, with contamination from chlorinated solvents. However, the nature and extent of contamination have not been fully characterized, and has been complicated by past pumping of deep contaminated groundwater that was then discharged into surficial recharge basins. Preliminary remedial action objectives for the site are:

- Prevent ingestion and direct contact with groundwater which has contaminants of potential concern concentrations greater than preliminary remediation goals (PRGs) to be determined during the Feasibility Study

- Minimize the potential for additional migration of groundwater with contaminants of potential concern concentrations which exceed the PRGs to local supply wells, especially if a source or sources of high levels of contamination is discovered

- Minimize human exposure in indoor VOC vapors, if VOC contamination is observed at or near the top of the water table and if indoor VOC vapors are the same as known site groundwater contamination (i.e., chlorinated VOCs)

## 3.6 Need for Treatability Studies

At this time, treatability studies are not anticipated for this RI/FS. Any treatability studies that might be required by EPA will be identified and conducted at a later date when available data will allow characterization and delineation of the plume. However, CDM will research viable technologies that will be applicable to the types of contaminants identified in the groundwater and the site conditions. A technical memorandum will summarize the results of this literature research.

# Section Four

Section 4

# Section 4
# Work Plan Rationale

## 4.1 Data Quality Objectives

DQOs are qualitative and quantitative statements which specify the quality of data required to support decisions regarding remedial response activities. DQOs are based on the end uses of the data collected. The data quality and level of analytical documentation necessary for a given set of samples will vary, depending on the intended use of the data.

As part of the work plan scoping effort, site-specific remedial action objectives were developed. Sampling data will be required to evaluate whether or not remedial alternatives can meet the objectives. The intended uses of these data dictate the data confidence levels. The guidance document *Guidance for Data Quality Objectives Process, EPA QA/G-4,* (EPA 1994) was used to determine the appropriate analytical levels necessary to obtain the required confidence levels. The three levels are screening data with definitive level data confirmation, definitive level data, and measurement-specific DQO requirements (Table 4-1).

The applicability of these levels of data will be further specified in the QAPP. Sampling and analytical data quality indicators (DQIs) such as precision, accuracy, representativeness, comparability, completeness, and sensitivity will also be defined in the QAPP. The seven step DQO evaluation will be included in the site-specific QAPP.

## 4.2 Work Plan Approach

CDM has developed an investigation that will evaluate the nature and extent of groundwater contamination. Groundwater sampling results will generate data to support a data evaluation summary report, a remedial investigation report, a human health risk assessment, and a feasibility study. Definitive-level data will be used to support the objectives of this RI/FS.

The overall objectives of the RI/FS are to determine the nature and extent of contamination in groundwater at the Roosevelt site, in order to evaluate appropriate remedial alternatives. Specifically, the RI is designed to collect information:

- To determine the rate and direction of groundwater movement
- To determine if residual contamination exists in source areas associated with former air field activities
- To determine the area, depth, and extent of groundwater contamination plume(s), with initial focus on areas expected to have higher levels of contamination
- To determine if groundwater contamination, if present at the top of the water table, vaporizes and moves through the vadose zone and into basements of buildings at 100 and 200 Garden City Plaza
- To perform a human health risk assessment of the identified contamination
- To support the selection of an approach for site remediation, if necessary

- To support a comprehensive Record of Decision (ROD)

RAC II field team personnel will collect environmental samples in accordance with the rationale described in Section 5.3 of this work plan. All standard EPA sample collection and handling techniques will be utilized. Groundwater screening samples will be analyzed by a subcontract laboratory for low detection limit VOC, with results provided by fax within two days of sampling. Groundwater samples from multi-port wells will be analyzed through the Contract Laboratory Program (CLP) for low detection VOCs as Routine Analytical Services (RAS) samples. Ten percent of the multi-port well samples will be analyzed for the full Target Compound List (TCL) analyses and Target Analyte List (TAL) through the CLP. Ten percent of the multi-port well samples will also be analyzed for bioremediation parameters, including total organic carbon (TOC), nitrate, chloride, methane/ethane/ethene, soluble manganese, ferrous iron, sulfate, and hydrogen sulfide. Samples collected from existing monitoring wells and Garden City supply wells 10 and 11 will be analyzed for full TCL and TAL analytes through the CLP system, and bioremediation parameters. The bioremediation parameters will be analyzed by EPA's DESA laboratory or by a subcontract laboratory using EPA-approved standard methods. A summary of all analytical parameters is included on Table 5-2.

The RAS CLP analytical results will be validated by EPA Region II. CDM will validate all subcontract laboratory data using the protocols specified in the EPA-approved analytical methods. CDM will then tabulate and evaluate the data and use it to characterize contamination at the site. The data will form the basis of the data evaluation summary report, the RI report, the human health risk assessment, and the FS.

Groundwater flow direction and rate of movement will be determined by measurements taken in the multi-port wells and the traditional monitoring wells (assuming such wells can be located). Potentiometric surface maps will be created and flow will be estimated based on gradients from the maps and overall knowledge of Long Island hydrogeological conditions (e.g., locations of groundwater flow divides).

5

# Section Five

# Section 5
# Task Plans

The tasks identified in this section correspond to EPA's Statement of Work (SOW) for the Roosevelt site, dated June 25, 2001. The tasks for the RI/FS presented below correspond to the applicable tasks presented in the *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA 1988). In addition, EPA's SOW includes a task for project close-out. The order in which these tasks are presented and the task numbering scheme correspond to the work breakdown structure provided in EPA's SOW.

The scope of the field investigations for the RI/FS was discussed with EPA and other project stakeholders in conference calls on November 4 and 5, 2004. Field work will include installation of monitoring wells utilizing mud rotary drilling, Westbay multi-port wells, and groundwater sampling of multi-port wells and existing monitoring wells/supply wells. If groundwater contamination is detected at the water table, vapor samples will be collected beneath the basements of 100 and 200 Garden City Plaza. It should be noted that the basements of these buildings are used for building maintenance activities, including three large oil-fired boilers for heating four commercial office buildings (100, 200, 300 and 400 Garden City Plaza).

## 5.1 Task 1 - Project Planning and Support

The project planning task generally involves several subtasks that must be performed in order to develop the plans and the corresponding schedule necessary to execute the groundwater RI. These subtasks include project administration, conducting a site visit, performing a review and detailed analysis of existing data, attending technical scoping meetings with EPA and other support agencies, preparing this RI/FS work plan, preparing the QAPP and HSP, and procuring and managing subcontractors.

### 5.1.1 Project Administration

The project administration activity involves regular duties performed by the CDM site manager (SM) and the Program Support Office throughout the duration of this work assignment. CDM will provide the following project administration support in the performance of this work assignment.

The SM will:

- Prepare the technical monthly report
- Review weekly financial reports
- Review and update the project schedule
- Attend quarterly internal RAC II meetings
- Communicate regularly with the EPA Remedial Project Manager (RPM)
- Prepare staffing plans

The Program Support Office personnel will:

- Review the work assignment technical and financial status
- Review the monthly progress report
- Provide technical resource management
- Review the work assignment budget

- Respond to questions from the EPA project officer and contracting officer
- Prepare and submit invoices

### 5.1.2 Attend Scoping Meeting

Following the receipt of this work assignment on June 25, 2001, the CDM SM, the CDM RAC II technical operations manager, the CDM program manager, and the CDM finance and administration manager attended an initial scoping meeting with the EPA contracting officers, the EPA project officer, the EPA RPM, and the EPA hydrogeologist on July 12, 2001 in New York, to outline and discuss the project scope.

### 5.1.3 Conduct Site Visit

The CDM SM and RI task manager/site geologist conducted site visits on July 17, 2001 and November 8, 2004 to develop a better understanding of local and site-specific conditions. The CDM personnel were accompanied by the EPA RPM and EPA hydrogeologist during the site visit. The site visits consisted of visual observation of site conditions and current use, observing the Garden City supply wells and recharge basins, and evaluating potential logistical and health and safety issues.

### 5.1.4 Develop Draft Work Plan and Associated Cost Estimate

CDM has prepared this RI/FS work plan in accordance with the contract terms and conditions. CDM used existing site data and information, information from EPA guidance documents (as appropriate) and technical direction provided by the EPA RPM as the basis for preparing this work plan.

This work plan includes a comprehensive description of project tasks, the procedures to accomplish them, project documentation, and a project schedule. CDM uses internal quality assurance/quality control (QA/QC) systems and procedures to assure that the work plan and other deliverables are of professional quality requiring only minor revisions (to the extent that the scope is defined and is not modified). Specifically, the work plan includes the following:

- Identification of RI project elements including planning and activity reporting documentation, field sampling and analysis activities. A detailed work breakdown structure of the RI corresponds to the work breakdown structure provided in the EPA SOW (dated June 25, 2001) and discussions with EPA.

- CDM's technical approach for each task to be performed, including a detailed description of each task, the assumptions used, any information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. Issues relating to management responsibilities, site access, site security, contingency procedures and storage and disposal of investigation derived wastes are also addressed. Information is presented in a sequence consistent with the SOW.

- A schedule with dates for completion of each required activity, critical path milestones and submission of each deliverable required by the SOW and the anticipated review time for EPA.

- A list of key contractor personnel supporting the project (Section 7) and the subcontractor services required for the work assignment.

CDM prepared and submitted a draft work plan budget (as Volume II of the RI/FS work plan) that follows the work breakdown structure in the SOW. The draft work plan budget contains a detailed cost breakdown, by subtask, of the direct labor costs, subcontractor costs, other direct costs, projected base fee and award fee pool, and any other specific cost elements required for performance of each of the subtasks included in the SOW. Other direct costs are broken down into individual cost categories as required for this work assignment, based on the specific cost categories negotiated under CDM's contract. A detailed rationale describing the assumptions for estimating the level of effort (LOE), professional and technical levels and skills mix, subcontract amounts, and other direct costs are provided for each subtask in the SOW.

### 5.1.5 Negotiate and Revise Draft Work Plan/Budget

CDM personnel attended a work plan negotiation meeting on November 24, 2004. EPA and CDM personnel discussed and agree upon the final technical approach and costs required to accomplish the tasks detailed in the work plan. Prior to the negotiation meeting, CDM re-evaluated the approach for the field investigation, based on unsuccessful use of sonic drilling on Long Island in recent years. Project stakeholders agreed to the use of mud rotary drilling at eight multiport well locations. Tasks and subtasks affected by the change in drilling method and reduced number of initial multiport wells were re-costed and submitted to EPA for review.

CDM will submit a negotiated work plan and budget incorporating the agreements made in the negotiation meeting. The negotiated work plan budget will include a summary of the negotiations. CDM will submit the negotiated work plan and budget in both hard copy and electronic formats.

### 5.1.6 Evaluate Existing Data and Documents

As part of the preparation of the work plan, CDM reviewed data collected during previous investigations at the site. Analytical data and other information from these background documents has been incorporated, where applicable, into this planning document. Existing data are summarized in Section 3.

### 5.1.7 Quality Assurance Project Plan

<u>Quality Assurance Project Plan</u>

CDM will prepare a QAPP in accordance with current EPA Region II guidance and procedures. The QAPP will be submitted as a separate deliverable. The QAPP describes the project objectives and organization, functional activities, and QA/QC protocols that will be used to achieve the required DQOs. The DQOs will, at a minimum, reflect the use of analytical methods to identify and address contamination consistent with the levels for remedial action objectives identified in the NCP.

The QAPP includes sampling objectives; sample locations and frequency; sampling equipment and procedures; personnel and equipment decontamination procedures; sample handling and analysis; and a breakdown of samples to be analyzed through the CLP and through other sources, as well as the justification for those decisions. The QAPP is written so that a field sampling team unfamiliar with the site would be able to gather the samples and field measurements. Technical Standard Operating Procedures (SOPs) are included in the QAPP. Each SOP or QA/QC protocol has been prepared in accordance with EPA Region II guidelines and the site-specific HSP.

The QAPP also addresses site management, including site control and site operations. The site control section describes how approval to enter the areas of investigation will be obtained, along with the site security control measures, and the field office/command post for the field investigation. The logistics of all field investigation activities are described. The site operations section includes a project organization chart and delineates the responsibilities of key field and office team members. A schedule will be included that shows the proposed scheduling of each major field activity.

Any significant changes to the QAPP will be documented in a letter to the EPA RPM and EPA quality assurance officer.

<u>Other Quality Assurance/Quality Control Activities</u>
Quality assurance activities to be performed during the implementation of this work plan may also include internal office and field or laboratory technical systems audits, field planning meetings, and quality assurance reviews of all project plans, measurement reports, and subcontractor procurement packages. The quality assurance requirements are discussed further in Section 7.2 of this work plan.

### 5.1.8 Health and Safety Plan

CDM will prepare a HSP in accordance with 40 CFR 300.150 of the NCP and 29 CFR 1910.120 (1)(1) and (1)(2). The HSP includes the following site-specific information:

- Hazard assessment
- Training requirements
- Definition of exclusion, contaminant reduction, and other work zones
- Monitoring procedures for site operations
- Safety procedures
- Personal protective clothing and equipment requirements for various field operations
- Disposal and decontamination procedures
- Other sections required by EPA

The HSP also includes a contingency plan which addresses site specific conditions which may be encountered.

In addition to the preparation of the HSP, health and safety activities will be monitored throughout the field investigation. The HSP will specify air monitoring procedures in the exclusion zone established around the drilling rig that comply with NYSDOH's community air monitoring plan (CAMP) requirements. A qualified health and safety coordinator, or designated representative will attend the initial field planning meeting and may perform a site visit to ensure that all health and safety requirements are being adhered to. A member of the field team will be designated to serve as the onsite health and safety coordinator throughout the field program. This person will report directly to both the field team leader and the health and safety coordinator. The HSP will be subject to revision, as necessary, based on new information that is discovered during the field investigation.

### 5.1.9 Non-RAS Analyses

This subtask is not required for this work assignment. Non-RAS analyses are described in Section 5.4.3.

### 5.1.10 Meetings

CDM will participate in various meetings with EPA during the course of the work assignment. As directed by EPA's SOW, CDM has assumed eight meetings, with two people in attendance, for four hours per meeting. CDM will prepare minutes which list the attendees and summarize the discussions in each meeting.

### 5.1.11 Subcontract Procurement

This subtask will include the procurement of all subcontractors required to complete the field investigation activities. Procurement activities include: preparing the technical statement of work; preparing Information for Bidders (IFB) or Request for Proposal (RFP) packages; conducting pre-bid site visits (when necessary); responding to technical and administrative questions from prospective bidders; performing technical and administrative evaluations of bid documents; performing the necessary background, reference, insurance, and financial checks; preparing consent packages for approval by the EPA contracting officer (when necessary); and awarding the subcontract.

To support the proposed field activities, the following subcontractors will be procured:

- A New York licensed driller to install groundwater screening locations and monitoring wells
- Westbay Instruments, Inc. to install the multiport well systems
- An analytical laboratory subcontractor to perform non-RAS analyses described in Section 5.4.3 and on Table 5-2
- A New York licensed surveyor to survey the location and elevation of all monitoring wells that will be sampled for the RI/FS
- A cultural resources subcontractor to conduct a Phase IA survey of the local area
- A geophysical subcontractor to mark out locations of underground utilities at each drilling location
- A subcontractor to haul and dispose of investigation derived waste (IDW), responsible for the removal and proper disposal of drums and storage tanks containing RI generated waste liquids and solids

All subcontractor procurement packages will be subject to CDM's technical and quality assurance reviews.

It should be noted that the Westbay subcontract procurement will be done as a sole-source procurement. Because of the specialized conditions at the Roosevelt site and the thickness of the contaminated aquifer (up to 450 feet), Westbay makes the only multi-port well system able to accommodate more than seven ports per borehole. Five of the eight multi-port wells will have 10 ports in each borehole. The remaining three multi-port wells will have six ports. In addition, the Westbay multiport system has been installed successfully in boreholes drilled using the mud rotary method. Because of the depth of the boreholes (450 feet) and drilling conditions on Long Island (flowing sands resulting in collapsed boreholes), mud rotary has been judged as the drilling method most likely to encounter the fewest problems during drilling to the required depth.

### 5.1.12 Perform Subcontract Management

The CDM SM and the CDM subcontracts managers will perform the necessary oversight of the subcontractors (identified under Section 5.1.11) needed to perform the RI/FS. CDM will institute procedures to monitor progress, and maintain systems and records to ensure that the work proceeds according to the subcontract and RAC II contract requirements. CDM will review and approve subcontractor invoices and issue any necessary subcontract modifications.

### 5.1.13 Pathway Analysis Report

In accordance with OSWER Directive 9285.7-01D-1 entitled *Risk Assessment Guidelines for Superfund - Part D* (1998), CDM will provide EPA with standard tables, worksheets, and supporting information for the risk assessment as interim deliverables prior to preparation of the full baseline risk assessment report. CDM will prepare a pathways analysis report (PAR) that consists of Risk Assessment Guidance for Superfund (RAGS) Part D Standard Tables 1 through 6 and supporting text. The PAR will summarize the key assumptions regarding potential receptors, exposure pathways, exposure variables, chemical distribution, and chemical toxicity that will be used to estimate risk in the baseline risk assessment. Because RAGS Part D Tables 2 and 3 summarize site data, these tables of the PAR will be prepared once analytical data collected during the RI site investigation are available. Preparation of the PAR initiates the risk assessment process, whose components are described in greater detail in Section 5.7.1.

CDM will coordinate with EPA to define potential exposure pathways and human receptors. To accomplish this, CDM will review all available information obtained from EPA pertaining to the Roosevelt site, including data generated during previous investigations. CDM will integrate this information with site data generated during the RI site investigation. Background information on the site will be summarized, and samples collected and the chemicals analyzed for in various media will be discussed. The treatment of data sets (e.g., duplicates, splits, blanks [trip, field, and laboratory], multiple rounds, and qualified and rejected data) will be discussed, and chemical-specific exposure point concentrations (EPCs) for each exposure scenario will be estimated. Based on current knowledge, potential receptors include any users of the municipal water supplies that draw on the contaminated portion of the aquifer (assuming that treatment of the water were not in place). The receptors with the highest potential exposures are residents (adults and children) who use the groundwater as drinking water. Exposure variables to be used for the calculation of daily intakes will be presented. Carcinogenic and noncarcinogenic toxicity values for contaminants of concern and the sources of these values will be presented in the PAR. As noted above, the selection of chemicals of potential concern, exposure pathways and receptors, exposure concentrations, exposure variables, and toxicity values will be summarized in tabular form in accordance with the Standard Tables of RAGS Part D.

Upon EPA's approval of the PAR, CDM will estimate potential exposures and risks associated with the site and initiate preparation of the draft baseline risk assessment report as described in Section 5.7.

## 5.2 Task 2 - Community Relations

CDM will provide technical support to EPA during the performance of the following community relations activities throughout the RI/FS in accordance with *Community Relations in Superfund-A Handbook* (EPA 1992c).

### 5.2.1 Community Interviews

CDM will perform the following requirements:

- Preparation for Community Interviews - CDM will review background documents and provide technical support to EPA in conducting community interviews with government officials (federal, state, county, township, or city), environmental groups, local broadcast and print media, either in person or by telephone.
- Questions for Community Interviews - CDM will prepare draft interview questions for EPA's review. Final questions will reflect EPA's comments on the draft questions.

### 5.2.2 Community Relations Plan

CDM will prepare a draft Community Relations Plan (CRP) that presents an overview of community concerns. The CRP will include:

- Site background information including location, description, and history
- Community overview including a community profile, concerns, and involvement
- Community involvement objectives and planned activities, with a schedule for performance of activities
- Mailing list of contacts and interested parties
- Names and addresses of information repositories and public meeting facility locations
- List of acronyms
- Glossary

CDM will submit a Final CRP which reflects EPA's comments.

### 5.2.3 Public Meeting Support

CDM will perform the following activities in support of public meetings, availability sessions, and open houses:

- Make reservation for meeting space, in accordance with EPA's direction
- Attend two public meetings or availability sessions, and prepare draft and final meeting summaries
- Reserve a court reporter for each public meeting
- Provide full-page and "four on one" page copy of meeting transcripts, both in hard copy and a 3.5-inch diskette in Word Perfect 8.0
- Prepare and maintain a sign-in sheet for each public meeting

CDM will develop draft visual aids (i.e., transparencies, slides, and handouts) as instructed by EPA. CDM will develop final visual aids incorporating all EPA comments. For budgeting purposes, CDM will assume 20 overhead transparencies, 10 slides, and 100 handouts for each public meeting.

### 5.2.4 Fact Sheet Preparation

CDM will prepare draft information letters/updates/fact sheets. CDM will research, write, edit, design, lay out, and photocopy the fact sheets. CDM will attach mailing labels to the fact sheets before delivering them to EPA from where they will be mailed. For budgeting purposes, CDM will assume two fact sheets (one for each public meeting), two to four pages in length, with three illustrations per fact sheet.

Final fact sheets will reflect EPA's comments.

### 5.2.5 Proposed Plan Support

CDM will provide administrative and technical support for the preparation of the draft and final Proposed Plan describing the preferred alternative and the alternatives evaluated in the FS. The Proposed Plan will be prepared in accordance with the NCP and the most recent version of *EPA Community Relations in Superfund - A Handbook* (EPA 1992c). The Proposed Plan will describe opportunities for public involvement in the ROD.

A draft and final Proposed Plan will be prepared. The final will reflect EPA comments.

### 5.2.6 Public Notices

CDM will prepare newspaper announcements/public notices for each public meeting, for inclusion in the most widely read local newspaper. Two public announcements/notices are assumed.

### 5.2.7 Information Repositories

In accordance with the SOW, this subtask is currently not applicable to this work assignment.

### 5.2.8 Site Mailing List

CDM will update the community relations mailing list twice for the Roosevelt site. The mailing list will be developed under Subtask 5.2.2. and is estimated to consist of 100 names. CDM will provide EPA with a copy of the mailing list on diskette and mailing labels for each mailing. EPA will do the actual mailing of any information to the community.

### 5.2.9 Responsiveness Summary Support

CDM will provide administrative and technical support for the Roosevelt site Responsiveness Summary. The draft document will be prepared, compiling and summarizing the public comments received during the public comment period on the Proposed Plan. CDM will prepare technical reviews of selected public comments, for EPA review and use in preparing formal responses. CDM assumes 100 separate comments will be received and that 50 responses will be necessary.

## 5.3 Task 3 - Field Investigation

This task includes all activities related to implementing the RI/FS field investigation at the Roosevelt site. The task descriptions have been developed after review and evaluation of all site background data currently available to CDM. In addition, discussions during meetings and telephone conversations with representatives of EPA were instrumental in developing this work plan.

The overall objective of the RI/FS is to locate and define the source area of the groundwater VOC plume, characterize the groundwater contamination in the area south of the site, and determine if there is any potential impact to other public supply wells in the area. If groundwater contamination is identified at the top of the water table, vapor samples will be collected at 100 and 200 Garden City Plaza, underneath the building concrete basements. The media to be sampled include groundwater and indoor air vapor (if necessary). The data generated from the investigation will be used to support an RI report, a human health risk assessment, an FS report and to provide a basis for recommendations to EPA concerning the approach to and direction of further investigations at the Roosevelt site. This task includes all activities related to implementing the field investigation at the site.

### 5.3.1 Site Reconnaissance

To complete this RI/FS work plan, CDM conducted an initial site visit to become familiar with local and site-specific conditions. CDM's SM and RI task leader conducted a walk-through and a vehicular reconnaissance of the site and surrounding area to evaluate logistical problems relevant to the implementation of the groundwater investigation.

As part of the initial site visit, CDM walked through the portion of the site covering the Village of Garden City water supply wells 10 and 11, the old Long Island Motor Parkway right of way (now owned by Nassau County), the Pembrook recharge basin, the Nassau County recharge basin 124, and Garden City Plaza (Buildings 100, 200, 300 and 400). A vehicular reconnaissance covered the east side of Stewart Road, the south side of Old Country Road, Ring Road around the shopping mall, and a portion of the residential area south of the site in the Village of Garden City. The locations of two other nearby sites (Pasley and Purex) with similar contaminants to the Roosevelt site were also briefly viewed.

CDM will conduct additional site reconnaissance activities to establish the exact locations of proposed drilling locations and monitoring wells. CDM will identify property boundaries and utility rights-of way; conduct geophysical utility mark outs; provide photographic documentation of site conditions, and assist with commercial and public property access. Site reconnaissance activities also will be performed, as necessary, to support mobilization and site preparation activities.

CDM will review the historical aerial photo interpretation of the site to determine if obvious sources of contamination (i.e., drums, lagoons) are identifiable. Final locations of proposed drilling locations will be determined after the results of the existing monitoring well location surveys (described under Subtask 5.3.3) and the aerial photo interpretation have been evaluated.

CDM will conduct oversight of both the surveying and cultural resources survey subcontractors under this subtask.

## 5.3.2 Mobilization and Demobilization

<u>Mobilization and Demobilization</u>

This subtask will consist of property access assistance, field personnel orientation, field office and equipment mobilization, and demobilization. Prior to RI field activities, each field team member will review all project plans and participate in a field planning meeting conducted by the CDM SM and RI task leader, to become familiar with the history of the site, health and safety requirements, field procedures, and related QC requirements. All new field personnel will receive a comparable briefing if they did not attend the initial field planning meeting and/or the tailgate kick-off meeting. Supplemental meetings may be conducted as required by any changes in site conditions or to review field operation procedures.

Equipment mobilization will entail the ordering, renting, and purchasing of all equipment needed for each part of the RI field investigation. Measurement and Test Equipment Forms will be completed for rental or purchase of equipment (instruments) that will be utilized to collect field measurements. T he field equipment will be inspected for acceptability, and instruments calibrated as required prior to use. This task also involves the construction of a decontamination area for sampling equipment and personnel. A separate decontamination pad will be constructed by the drilling subcontractor for drilling equipment.

Arrangements for the lease of a field trailer, a secure storage area for investigation derived waste, and associated utilities and services will be made. During the initial site visit, CDM personnel identified the Village of Garden City water supply well 10 and 11 property as the preferred location for the field trailer, an IDW storage compound, and decontamination area. Health and safety work zones including personnel decontamination areas will be established. Local authorities such as the police and fire departments will be notified prior to the start of field activities. Equipment will be demobilized at the completion of each field event, as necessary. Demobilized equipment will include sampling equipment, drilling subcontractor equipment, health and safety equipment, and decontamination equipment.

**Site Preparation**
CDM will conduct ground truthing for overhead utilities, surface features around subsurface sampling locations, and underground utilities (with a geophysical subcontractor procured under Subtask 5.1.11) during the site reconnaissance. Actual field conditions or community input may impact the final locations.

**Site Restoration**
Significant portions of the Roosevelt site field activities are expected to occur on commercial and public properties. In the event that landscaping or paving on and around these properties is damaged as a result of the proper performance of field investigation activities, such damages will be repaired and restored to the conditions existing immediately prior to such activities. CDM will maintain photographic documentation of site conditions prior to commencement of and after completion of RI field activities.

At the completion of the field activities, decontamination pad materials will be decontaminated and removed from the command post area, unless otherwise instructed by EPA. The decontamination and command post area will be restored, as near as practicable, to its original condition.

CDM personnel will perform field oversight and health and safety monitoring during all site restoration field activities.

## 5.3.3 Hydrogeological Assessment

**Existing Well Assessment**
CDM will inventory and attempt to locate existing monitoring wells mentioned in previous reports and investigations. Wells will be evaluated for use in the current investigation, including appropriateness of locations and screen interval. The condition of wells will also be assessed. If wells have not been sampled within the past several years, re-development may be necessary. CDM assumes that 10 existing wells will be suitable for sampling and that all will need redevelopment.

**Groundwater Screening/Monitoring Well Installation**
Based on information gathered to date for the Roosevelt site, it is likely that groundwater contamination from former site-related activities at the Old Roosevelt Field has occurred in the Upper Glacial Aquifer and the Magothy Aquifer. Contaminants such as chlorinated VOCs may be present as non-aqueous phase liquid beneath potential source areas and as dissolved phase contamination. Additional hydrogeological assessment is necessary to evaluate the full nature and extent of the groundwater contamination. It is possible that contamination may extend to 450 or

500 feet bgs, especially over some portions of the suspected site source areas. Of particular concern is the impact to the Magothy Aquifer underlying the Upper Glacial Aquifer, since the Magothy is the primary source of potable water for residents in the villages of Garden City and Hempstead.

Significant data gaps concerning the hydrogeologic framework of the site and the nature and extent of groundwater contamination include:

- Depth to groundwater across the site
- Elevation of the potentiometric surface of the Magothy Aquifer across the site
- Direction(s) of groundwater flow (both horizontal and vertical) in the Upper Glacial and Magothy aquifers
- Hydraulic conductivity of the Upper Glacial and Magothy aquifers
- Vertical and horizontal extent of DNAPL, if any exists, and dissolved phase contaminants in the Upper Glacial and Magothy aquifers
- Geometry, lithology, and extent of the aquifer units
- Effect of supply well pumping on localized groundwater flow and contaminant movement
- Extent to which natural attenuation is occurring and aquifer conditions that might promote or inhibit biodegradation of contaminants

CDM has designed an investigation program to fill the data gaps listed above. If significant contamination in the source areas is encountered, additional delineation may be necessary to fully characterize the extent of contamination.

<u>Soil Boring/Vertical Profile Sampling Point</u>

Initial characterization of the unconsolidated aquifer system will begin with an on-site soil boring/vertical profile groundwater sampling point (SVP) program. CDM will advance eight SVPs. The SVP data will be utilized to develop a profile of groundwater contamination and an understanding of the geologic stratigraphy that may affect contaminant migration. The characterization data will be utilized to select permanent screen intervals and groundwater sampling ports in multi-port monitoring wells.

- Five of the SVP locations are within and immediately downgradient of the potential source areas at the site (e.g., area of former Roosevelt Field aircraft maintenance hangars and beneath the former cooling water drain field at Garden City Plaza).
- Three SVPs will be advanced in areas south-southwest of the Roosevelt Field mall area, but upgradient of the Village of Hempstead public supply well field, to monitor dissolved phase contaminants in the Magothy Aquifer hydrologically downgradient of Roosevelt Field.

For the purposes of this work plan, tentative locations for eight SVP/monitoring wells are plotted on Figure 5-1 and are listed in Table 5-1.

Groundwater sampling will be conducted at 20-foot intervals starting at the water table to 450 feet bgs. Groundwater samples will be collected with a slotted probe pushed in front of the rotary bit and analyzed for low-detection limit VOCs by a subcontract laboratory, with 1 day turnaround for results. The groundwater screening data collected during installation of the SVPs will provide a basis for well screen installation for permanent multi-port monitoring wells installed within each of the boreholes. CDM will attempt to correlate the vertical and horizontal stratigraphic framework between SVP locations using the gamma logs from each borehole and to delineate the vertical and horizontal extent of groundwater contaminants using the groundwater screening sample results.

Eight soil borings will be drilled at the site to an estimated depth of 450 feet bgs. Table 5-1 provides location descriptions and a brief rationale for the placement for each SVP.

<u>*Source Area*</u>

SVP-1 Groundwater will be sampled in an area upgradient (on the north side of Old Country Road) of the former aircraft maintenance hangars. This location will serve as a background well.

SVP-2 This location will be completed near potential source areas that previously exhibited the highest recorded VOC contamination on site (at cooling water well N8050, with detections of total chlorinated VOCs in excess of 40,000 μg/L).

SVP-3 This location is near the well N5486 location, where elevated concentrations of chlorinated VOCs were detected.

SVP-4 This SVP will screen groundwater beneath the former drain field where elevated levels of dissolved phase VOCs were detected. The drain field was used to discharge partially treated water from cooling water wells during the 1970s and 1980s.

SVP-5 This SVP will monitor dissolved phase contamination approximately 1,500 feet south of SVP-2, immediately southeast of the former location of the cooling water drain field (near well N9310).

<u>*Downgradient Area*</u>

SVP locations SVP-6, SVP-7, and SVP-8 will be located downgradient of the Roosevelt Field mall, approximately 1.2 miles south-southwest of the suspected source area at SVP-2. They will be located north of the Village of Hempstead public supply well field to monitor potential migration of higher levels of contamination that may be moving toward the Village of Hempstead well field. The three downgradient SVPs will be advanced to approximately 450 feet bgs.

SVP-6 SVP-6 will monitor the eastern flank of a possible site-derived VOC plume. This location also may be used to monitor a plume associated with the area of former Navy hangars along Old Country Road.

SVP-7 SVP-7 will monitor the western flank of a possible site-derived VOC plume. This location also will serve as a sentinel well for the two Village of Garden City public supply wells that are located approximately 1.8 miles southwest of the source area at Roosevelt Field.

SVP-8 SVP-8 will be placed directly hydraulically downgradient of the source area, located along the presumed mid-line of the contaminant plume.

**SVP Installation and Testing**

*Borehole Drilling*

Each SVP borehole will be advanced using the mud-rotary drilling technique. Mud rotary was selected because it is a proven method that will minimize drilling problems caused by flowing sands. A salt-based tracer will be added to the drilling mud to help insure that mud is fully removed from the borehole after drilling. The borehole will be scanned for volatile organic compounds with an HNu (or equivalent) for health and safety purposes. No soil samples will be collected for laboratory analysis. Borehole drilling procedures will be fully detailed in the QAPP.

*Groundwater Profile Screening Samples*

Once drilling passes into the saturated zone, groundwater screening samples will be collected from temporary screening points pushed in front of the rotary bit at discrete 20-foot intervals from the water table to 450 feet bgs. Assuming the water table is at 40 feet bgs, 21 samples will be collected at each SVP location. Samples will be analyzed for VOCs known to be associated with the Roosevelt site (including at least TCE, DCE, and PCE) using a subcontract laboratory with one day turnaround for faxed results. If the lab is not within driving distance of the site, samples will be shipped for overnight delivery, with one day turnaround for results. Rapid turnaround of results will enable expedited selection of locations for the screen intervals, followed by selection of the port locations in the monitoring wells. Groundwater screening sample procedures will be detailed in the QAPP.

*Borehole Completion*

Upon reaching the terminal depth of the borehole, drilling mud will be removed, and the borehole will be completed with 4-inch diameter stainless steel outer casing and screens. The screen interval depths will e determined prior to installation, based on groundwater profile screening sample results. A surface casing will be installed, with a flush-mount completion. After the outer casing installation is completed, a gamma log will be run of the borehole to pinpoint locations of clays and lower permeability zones which may affect contaminant transport. Geophysical logging will be performed by CDM personnel. Borehole completion and gamma logging procedures will be detailed in the QAPP.

*Well Development*

After installation of the outer casings and screens, each screen interval will be fully developed. Development will be performed to remove drilling mud from the borehole and to provide a good hydraulic connection between the well and the aquifer materials. Well development procedures will be described in the QAPP.

Multi-port Monitoring Wells

Multi-port monitoring wells will be installed after all outer casings/screens have been installed and developed. Monitoring wells within the source area (Roosevelt Field mall) will be completed with 10 screen intervals/ports in each well. Monitoring wells in the downgradient area (north of the Hempstead well field) will be completed with six screens/ports. Selection of the screen/sampling port depths at each monitoring well will be based on several considerations, including:

- Groundwater screening sample results
- The known distribution of contaminants on the site
- Data from nearby public supply wells, including contaminant data and screen intervals

EPA will be notified of the proposed port intervals; completion will commence upon EPA approval.

The outer casings/screens will be constructed of 4-inch diameter stainless steel casing and 5-foot stainless steel screens at each selected port location. Westbay sampling ports will be installed in the screen intervals to monitor specific contaminated zones of the aquifer. Stainless steel casing and screens are proposed because of the depth of the monitoring wells (450 feet).

After outer screens and casings are installed in each borehole, the multi-port well assembly will be lowered into the borehole. The sampling port locations will coincide with the screen intervals in the borehole, with packers between the ports to minimize the potential for cross-contamination. Multi-port well installation procedures will be fully detailed in the QAPP.

Surface Water Reconnaissance/Evaluation

To determine whether a surface water body exists that could be potentially impacted by the contaminated groundwater plume, CDM will conduct a reconnaissance of an area within approximately two miles downgradient of the Roosevelt Field potential source area. As part of this subtask, CDM will evaluate whether any surface water bodies exist such as streams that have been channelized and/or buried during urbanization of the downgradient area (e.g., streams that are now flowing through culverts). According to the USGS *Lynbrook* 1:24,000 topographic map (1969), the nearest surface water body to the site is Hempstead Lake approximately 3.5 miles southwest of Roosevelt Field, which is of sufficient distance to preclude sampling of its surface waters.

### 5.3.4 Soil Boring, Drilling, and Testing

Groundwater screening during drilling and multi-port monitoring wells are fully described in Section 5.3.3. Because the multi-port monitoring wells are completed in the same borehole used for the groundwater screening program, the full discussion of drilling is included in Section 5.3.3.

### 5.3.5 Environmental Sampling

Table 5-2 summarizes the number of samples and associated analytical parameters for the various sampling events during the RI. Unless otherwise specified, analysis for TCL and TAL parameters through the CLP will be performed in accordance with the most current EPA CLP statements of work for multi-media, multi-concentration analyses for organics and inorganics. Non-RAS parameters will be analyzed by EPA's DESA laboratory in Edison, New Jersey or CDM's analytical laboratory subcontractor. Quality control samples will be collected in addition to the environmental samples discussed below. The number and type of quality control samples will be in accordance with the EPA Region II CERCLA QA Manual.

#### 5.3.5.1 Field Screening

The field screening program, including the number and types of samples that will be collected, is presented in Section 5.3.3, Hydrogeological Assessment. Sample analyses are provided in Table 5-2 and Section 5.3.5.2, Groundwater Sampling.

#### 5.3.5.2 Groundwater Sampling

Groundwater sampling will be conducted at the Roosevelt site to characterize the nature and extent of contamination of groundwater from contaminants associated with the site and to provide information to support the RI/FS. Groundwater sampling activities include: groundwater vertical profile screening samples and two rounds at newly installed multi-port monitoring wells, existing monitoring wells, and public potable supply wells. The total number of groundwater samples to be collected will be 168 vertical profile samples, 20 existing monitoring well samples, 4 public supply well samples, and 136 monitoring well samples (Table 5-2). In order to adequately track sample status, CDM will develop and maintain sample tracking spreadsheets for both CLP samples and samples sent to the subcontract laboratory. The spreadsheets include information on sample/CLP number, sample date, analytical fraction, data validation status, and data entry/QC status.

<u>Groundwater Vertical Profile Screening Samples</u>

The groundwater profile screening program is described in Section 5.3.3. Sampling procedures, analytical methods, detection limits, and QA/QC procedures for the groundwater screening samples will be fully detailed in the QAPP.

<u>Multi-Port Monitoring Well Samples</u>

CDM will collect two rounds of groundwater samples to define the nature and extent of site related groundwater contamination. A total of 136 samples will be collected from 10 sampling ports in each of the 5 new source area monitoring wells and from 6 sampling ports in each of the 3 new downgradient area wells (Figure 5-1). Fluid pressure measurements will be taken at each port to determine groundwater flow prior to sampling. Monitoring wells will be sampled following the protocols established for the Westbay multiport system, which will be fully detailed in the QAPP.

The quantity of groundwater that can be collected from the ports is limited by the size of the sampling apparatus (approximately one liter). Therefore, all groundwater samples will be analyzed for LDL VOCs. Multiple fillings of the sampling apparatus at the same port will be conducted at 10 percent (7) of the sampling ports to get sufficient volume of water for analysis of TCL SVOCs, pesticides/PCBs and full TAL metals plus cyanide. In addition, 10 percent of the samples also will be analyzed for nitrate, TOC, chloride, methane/ethane/ethene, soluble manganese, sulfate, and hydrogen sulfide. These latter data will support the natural attenuation evaluation. The sampling ports for the additional analyses will be selected after the groundwater screening survey is completed, in consultation with EPA. The dissolved oxygen, pH, temperature, conductivity, oxidation-reduction potential (Eh), and ferrous iron, of the water samples will be measured in the field at each of the sampling ports. The LDL VOC, TCL and TAL analytical fractions will be analyzed through the CLP. All other parameters will be analyzed by EPA's DESA laboratory or by a laboratory under subcontract to CDM. All samples will be analyzed using the most current EPA-approved methods. The analytical methods will be detailed in the QAPP.

For costing purposes CDM assumes that a total of 136 monitoring well samples will be collected.

<u>Existing Monitoring Well Samples</u>

An assessment of existing monitoring wells will be performed under Subtask 5.3.3. CDM assumes that 10 existing wells will be available for sampling; therefore, it is anticipated that a total of 20 groundwater samples will be collected from existing monitoring wells, utilizing the low-flow purging and sampling technique. It is also assumed that the well screens in the existing monitoring wells are 10 feet in length. Packers will not be necessary to limit the screen interval to 10 feet for the low flow method.

The 20 groundwater monitoring well samples will be analyzed for full TCL organics (including low detection limit volatiles) and full TAL metals plus cyanide through the CLP. In addition, all of the samples also will be analyzed for nitrate, TOC, chloride, methane/ethane/ethene, soluble manganese, sulfate, and hydrogen sulfide by EPA's DESA laboratory or by a laboratory under subcontract to CDM. These latter analyses will support the evaluation of natural attenuation in the aquifer(s). The DO, pH, temperature, conductivity, Eh, and ferrous iron of the water samples will be measured in the field. All samples will be analyzed using the most current EPA-approved methods. The analytical methods will be detailed in the QAPP.

<u>Garden City Supply Well Samples</u>

Of more than 11 active public supply wells within the vicinity of the Roosevelt site, the two Village of Garden City wells (N3934 and N3935) are known to be significantly impacted by site contaminants. Samples from these wells will be collected from taps located closest to the well head and have not been filtered or treated. Two rounds of groundwater sampling will be conducted at the Village of Garden City wells. The supply well samples will be analyzed for full TCL organics (including low detection limit volatiles) and full TAL metals plus cyanide by a CLP laboratory. In addition, all of the samples also will be analyzed for nitrate, TOC, chloride, methane/ethane/ethene, soluble manganese, sulfate, and hydrogen sulfide by EPA's DESA laboratory or by a laboratory under subcontract to CDM. The DO, pH, temperature, conductivity, Eh, and ferrous iron of the water samples will be measured in the field. All samples will be analyzed using the most current EPA-approved methods. The analytical methods will be detailed in the QAPP.

For budgeting purposes, CDM will assume that two rounds of sampling will be conducted at the two wells for a total of four supply well samples.

### 5.3.5.3 Air Sampling

<u>Community Air Monitoring Plan</u>

CDM will establish air monitoring protocols in the site-specific HSP to comply with the NYSDOH air monitoring guidelines. Measurements will be taken continuously inside the exclusion zone around the drilling rig to maximize protection of on-site personnel. The following actions will be taken, if necessary:

- If ambient air concentrations of total VOCs exceeds 5 parts per million (ppm) above background, work activities will be temporarily halted until VOC-levels drop below 5 ppm above background.
- If total VOCs persist at levels in excess of 5 ppm over background but less than 25 ppm, the source of vapors will be identified and corrective actions taken to abate emissions. After this step, work activities can resume if the total VOC vapor level 200 feet downwind of the exclusion zone (or half the distance to the nearest potential receptor) is below 5 ppm over background.
- If organic vapor levels exceed 25 ppm at the perimeter of the work area, activities will be shut down.

No air samples from this monitoring will be submitted for laboratory analysis. Protocols will be specified in the HSP and in the QAPP.

<u>Vapor Samples</u>

If groundwater contamination is present in the groundwater at the top of the water table (as measured by the groundwater screening samples), vapor samples will be collected (for VOA analysis only) beneath the concrete basements of 100 and 200 Garden City Plaza. One air canister will be placed in the basement of each building for 24 hours. Prior to sampling, the geophysical subcontractor will evaluate the basement slab for metallic objects in the concrete (e.g., tubing for electrical wires). The drilling subcontractor will drill a 1.5 inch diameter hole through the concrete slab so a stainless steel tube can be pushed one foot into the material below the slab for vapor testing. A small pump will be attached to the top to the tube for collection of the air sample. Air sampling will consist of the following activities:

- Detailed evaluation of the basement areas of both buildings
- Geophysical survey of the selected basement area
- Drilling and placement of stainless steel tube beneath the slabs
- Set up, operation and take down of sampling equipment

- Analysis of air samples by a subcontract laboratory
- Data validation of air samples

It should be noted that the basements of 100 and 200 Garden City Plaza are used for building maintenance activities, including three large oil-fired boilers for heating four commercial office buildings (100, 200, 300 and 400 Garden City Plaza).

Air sampling procedures and analytical methods will be specified in the QAPP.

### 5.3.6 Ecological Assessment

This subtask is included as optional. If directed by EPA, the CDM ecologist will conduct a tour of the site to determine if sensitive habitats exist and if threatened or endangered species are likely to inhabit any areas of the site. A brief literature search will also be conducted to determine if threatened or endangered species have been identified in the vicinity of the Roosevelt site. A letter report documenting the findings of the site visit and literature search will be submitted to EPA.

### 5.3.7 Geotechnical Survey

This subtask is optional. Currently, cone penetrometer surveys are not anticipated for this project.

### 5.3.8 Disposal of Field Generated Waste

A subcontractor will be procured that will be responsible for the removal and proper disposal of all IDW, including drilling mud, waste soils, liquids, solids, and personal protective equipment. Representative waste samples will be collected and analyzed by a laboratory to characterize the waste. A technical statement of work will be prepared for the procurement of the waste hauling and disposal subcontractor under Subtask 5.1.11. Field oversight and health and safety monitoring will be conducted during all waste disposal field activities.

## 5.4 Task 4 - Sample Analysis

Section 5.3.5 and Table 5-2 specify the analyses for each type of groundwater sample. Details are summarized below.

- <u>Groundwater Screening Samples</u>: Screening samples will be analyzed for low detection limit VOCs, with 2-day turnaround for faxed results.

- <u>Multi-port Monitoring Wells</u>: All 136 multi-port samples will be analyzed for low detection limit TCL VOCs. Ten percent (7 sampling ports x 2 rounds = 14 samples) also will be analyzed for TCL SVOCs, pesticides/ PCBs and full TAL metals plus cyanide. In addition, 10 percent (7 sampling ports x 2 rounds = 14 samples) will be analyzed for nitrate, TOC, chloride, methane/ ethane/ethene, soluble manganese, ferrous iron, sulfate, and hydrogen sulfide. The sampling ports for the additional analyses will be selected after the groundwater screening survey is completed, subject to EPA approval.

- Existing Wells and Supply Wells: Twenty-four monitoring well/supply well samples will be analyzed for full TCL organics (including low detection limit volatiles) and full TAL metals plus cyanide. In addition, all of the samples also will be analyzed for nitrate, TOC, chloride, methane/ethane/ethene, soluble manganese, ferrous iron, sulfate, and hydrogen sulfide.

- Indoor Air Samples: Two samples of vapors below the concrete slabs will be collected from the basements of two buildings and analyzed for VOCs. Samples will only be collected if groundwater contamination is detected at the water table.

### 5.4.1 Innovative Methods/Field Screening Sample Analysis
This subtask is not applicable to the remedial investigation.

### 5.4.2 Analytical Services Provided via CLP or DESA
All RAS TCL and TAL samples will be analyzed through the CLP, including the low detection limit volatiles, using methods specified in the most current and applicable EPA Statements of Work.

Non-RAS parameters, including nitrate, TOC, chloride, methane/ethane/ethene, soluble manganese, ferrous iron, sulfate, and hydrogen sulfide, will be performed by EPA's DESA Laboratory, if capacity is available.

### 5.4.3 Subcontractor Laboratory for Non-RAS Analyses
CDM will procure a subcontract laboratory for analysis of non-RAS samples, including fast turnaround (2 day) low detection limit VOCs from the groundwater screening program. If DESA does not have capacity to analyze the non-RAS parameters listed in Section 5.4.2, the samples will be analyzed by the subcontract laboratory.

The laboratory subcontractor will be selected by EPA-approved criteria and will follow the most current EPA protocols and Region II QA requirements. The CDM RQAC will ensure that the laboratory meets all EPA requirements for laboratory services. The number of samples and analytical parameters are defined on Table 5-2. The analytical test methods, levels of detection, holding times, parameters, field sample preservation and QC samples will be provided in the QAPP.

## 5.5 Task 5 - Analytical Support and Data Validation
CDM will validate the non-RAS environmental samples collected under Task 3; EPA will validate all RAS analytical data for the RI investigation.

### 5.5.1 Collect, Prepare and Ship Samples
Sample preparation and shipment is included under Task 3.

### 5.5.2 Sample Management

The CDM analytical services coordinator (ASC) will be responsible for all RAS CLP laboratory bookings and coordination with the Sample Management Office (SMO), the Regional Sample Control Center (RSCC), the Division of Environmental Science and Assessment (DESA), and/or other EPA sample management offices for sample tracking prior to and after sampling events.

For all RAS activities, CDM will notify the Contract Laboratory Analytical Support Services (CLASS) to enable them to track the shipment of samples from the field to the laboratories and to ensure timely laboratory receipt of samples. Sample trip reports will be sent directly to the RSCC and the EPA RPM within 10 working days of final sample shipment, with a copy sent to the CDM ASC.

The CLP laboratories will be responsible for providing organic and inorganic analytical data packages to the Region II shipping coordinator for data validation by EPA.

Samples analyzed by the DESA laboratory and/or the subcontract laboratory will be coordinated by the ASC. All analytical data packages from the subcontract laboratory will be sent directly to CDM for data validation. If requested, CDM will send these validated data packages to EPA for QA review purposes. The data will be delivered in a format conducive for database input. CDM will provide the subcontract laboratory with a format for the electronic data deliverable.

### 5.5.3 Data Validation

All RAS samples will be analyzed by a laboratory participating in the CLP and all analytical data will be validated by EPA. The non-RAS data will be validated by CDM validators, who will use the requirements and the quality control procedures outlined in the associated methods and as per the analytical statement of work for the laboratory subcontractor. The validation will determine the usability of the data. All validated data results will be presented in an appendix to the RI report. A data validation report summarizing the results of data validation will be submitted to EPA after all data have been validated.

Data validation will verify that the analytical results were obtained following the protocols specified in the CLP SOW, and are of sufficient quality to be relied upon to prepare a human health risk assessment, to prepare an RI report, and to support a ROD.

The groundwater screening samples will not be validated.

## 5.6 Task 6 - Data Evaluation

This task includes efforts related to the compilation of analytical and field data. All validated and unvalidated data will be entered into a relational database that will serve as a repository for data analysis, risk assessment, GIS, and data visualization. Environmental Quality Information Systems (EQuIS) will be used as the database.

Tables, figures, and maps will be generated from the data to support preparation of the data evaluation report, the RI report, the human health RA report, and the FS report. The data from this investigation will be reviewed and carefully evaluated to identify the nature and extent of site-related contamination.

### 5.6.1 Data Usability Evaluation

CDM will evaluate the usability of the data, including any uncertainties associated with the data. The data will be checked against the DQOs identified in the QAPP. Any qualifications to the data usability will be discussed in the quality assurance section of any reports presenting data.

### 5.6.2 Data Reduction, Tabulation and Evaluation

CDM will evaluate, interpret, and tabulate data in an appropriate presentation format for final data tables. The following will be used as general guidelines in the preparation of data for use in the various reports.

- Tables of analytical results will be organized in a logical manner such as by sample location number, sampling zone, or some other logical format.
- Analytical results will not be organized by laboratory identification numbers because these numbers do not correspond to those used on sample location maps. The sample location/well identification number will always be used as the primary reference for the analytical results. The sample location number will also be indicated if the laboratory sample identification number is used.
- Analytical tables will indicate the sample collection dates.
- The detection limit will be indicated in instances where a parameter was not detected.
- Analytical results will be reported in the text, tables and figures using a consistent and conventional unit of measurement such as µg/L for groundwater analyses and milligrams/kilogram (mg/kg) for soil analyses.
- EPA's protocol for eliminating field sample analytical results based on laboratory/field blank contamination results will be clearly explained.
- If the reported result has passed established data validation procedures, it will be considered valid.
- Field equipment rinsate blank analytical results will be discussed in detail if decontamination solvents are believed to have contaminated field samples.

Detailed information concerning the hydrogeological and physical characteristics of the site and the surrounding area will be gathered, reviewed, and evaluated for inclusion in the data evaluation report, the RI report, the RA report, and the FS report. The purpose of these activities will be to provide a detailed understanding of the site physical features and to assess how these features may affect contaminant source areas, potential migration pathways, and potential remedial alternatives.

<u>Data Mapping</u>

Figures will be generated in plan view and cross section to show the extent of groundwater contamination. Graphic illustrations in the data evaluation report and/or the RI report will include geological profiles, cross-sections, contaminant isoconcentration maps, and longitudinal and cross-sectional profiles of groundwater contamination. Plan view maps and figures will be generated using GIS to facilitate plan-view spatial data analysis. Figures will be generated to illustrate site features, historical sample locations, historical sampling results, current sample locations, current sampling results, locations where groundwater quality exceeds regulatory standards and criteria, and monitored natural attenuation (MNA) parameter concentrations (e.g., chloride, methane/ethane/ethene, manganese, ferrous iron, sulfate, and hydrogen peroxide) relative to contaminant concentrations. The presence and/or absence of the MNA parameters can indicate whether MNA is occurring in the aquifer.

A robust set of vertically distributed data will be collected from both the groundwater screening sampling process and the subsequent multi-port and well sampling process. These data will be evaluated using the three-dimensional contouring and analysis program Environmental Visualization Software (EVS). The lithology will be input into EVS to create a lithologic model of the site. Then the groundwater sampling results for both the screening sampling and the multi-port and well sampling will be contoured to create a model of the plume. This model will be used to analyze the plume geometry in three dimensions, determining influences from lithologic control, pumping of production wells, and infiltration of contaminated water. The contaminated volume of aquifer will be estimated and from that relative estimates of product released will be made, taking current treatment into account.

<u>Database Management</u>
CDM will use a relational environmental database and standard industry spreadsheet software programs for managing all data related to the sampling program. The system will provide data storage, retrieval, and analysis capabilities, and be able to interface with a variety of spreadsheet, word processing, statistical, GIS, and graphics software packages to meet the full range of site and media sampling requirements necessary for this work assignment.

Data collected during the RI will be organized, formatted, and input into the database for use in the data evaluation phase. All data entry will be checked for quality control throughout the multiple phases of the project. Data tables comparing the results of the various sampling efforts will be prepared and evaluated. Data tables will also be prepared that compare analytical results with both state and federal ARARs.

### 5.6.3 Modeling

Per direction from EPA, CDM will evaluate existing data and make an assessment of the need for groundwater modeling, in conjunction with the groundwater data, to complete an accurate characterization of the nature, extent, distribution and movement of site contamination. Modeling may be used to help to predict contaminant movement in the aquifers. The evaluation of existing data and an approach for the modeling will be summarized in a technical memorandum.

Groundwater models are generally used to evaluate groundwater flow, groundwater quality problems, and/or groundwater remediation alternatives. Prior to full scale modeling, CDM will provide EPA with the following information about the groundwater model before the model is run:

- The objectives and scope of the model
- Basic documentation for the model to be used
- A list of assumptions to be used in generating the model
- A list of the model variables and the units in which they are expressed
- A list of approximate preliminary input values to be used for the model variables, together with the calculations used to determine the input values
- A map showing the areal extent of the model and the major topographic features to be included
- A cross section illustrating the hydrogeologic framework to be used in the development of the model
- The rationale for lateral and vertical boundary conditions such as "no flow" or "constant head" boundaries
- Calibration targets for piezometric heads and mass balance
- All input assumptions regarding type of contaminants, level of contaminants at the source area at time zero, and mobility factors (for contaminant transport models)
- A description of the types of sensitivity analyses that will be considered and carried out
- References for all sources of data and assumptions used to develop the model
- A list of all significant rivers, streams, lakes, pumping wells and recharge basins in the vicinity of the site that may have an impact on groundwater flow patterns and an explanation of how the model will address these factors

All of the items listed above and related supporting data will be included in an appendix in both the RI report and the FS report, as appropriate. Results and problems encountered with computer model sensitivity analyses and calibration will be discussed in the text of the modeling appendix. The text will also discuss the following items:

- The initial conditions calibration model will be thoroughly review before remedial alternatives are modeled as part of the FS.
- Modeled groundwater extraction systems will include capture zone analysis in order to determine the effectiveness of extraction wells to prevent further migration of groundwater contamination. An accurate determination of extraction well capture zones will not be based solely on visual analysis of a predicted potentiometric surface map.
- Computer model input/output value printouts for each "run" discussed in the modeling appendix text will be provided, with an explanation of all numerical units and the type of display.
- Maps such as predicted groundwater flow or contaminant concentration maps will show the site boundary, surface water features, pumping wells, and any other features that are required to interpret the information.
- The computer model code will be available for review by EPA.
- A discussion of uncertainties and limitations of the computer model will be provided in the text of the modeling appendix.

### 5.6.4 Technical Memorandum (Data Evaluation Report)

Upon completion of data evaluation, CDM will prepare a data evaluation report for review and approval by EPA. The data evaluation report will establish site characteristics such as the media contaminated, the extent of contamination, and the physical boundaries of the contamination. If additional data are needed to determine the extent of contamination, CDM will provide recommendations to EPA for supplemental work at the Roosevelt site. The data evaluation report will include data results and will require technical and QA review prior to submittal to EPA.

## 5.7 Task 7 - Assessment of Risk

CDM will conduct a human health risk assessment and an optional ecological risk assessment for the Roosevelt site. The objective of the Roosevelt risk assessments is to provide a quantitative assessment of the potential for adverse health and environmental effects to occur as a result of exposure to chemical contaminants at the site.

The HHRA will determine whether site contaminants pose a current or potential risk to human health in the absence of any remedial action, and will be used to determine whether remediation is necessary at the site and to focus remediation on those media/exposure pathways that pose the greatest risk. Furthermore, the HHRA can provide a method for comparing the potential health impacts of various remedial alternatives.

For the HHRA, CDM will use EPA's standardized planning and reporting methods as outlined in EPA's Risk Assessment Guidance for Superfund (RAGS Part D). RAGS Part D provides guidance on standardized risk assessment planning, reporting, and review throughout the CERCLA remedial process, from scoping through remedy selection and completion and periodic review of the remedial action.

The ecological risk assessment, if conducted, will identify qualitatively the potential current and future environmental risks associated with the Roosevelt site that will exist if no action is taken. This assessment will be used to determine if remediation is necessary and where to focus remediation efforts.

### 5.7.1 Human Health Risk Assessment

The human health risk assessment will be performed in accordance with EPA guidance set forth in the following documents:

- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A* (EPA 1989a)
- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part B, Development of Risk Based Preliminary Remediation Goals* (EPA 1991a)
- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments* (EPA 1998, or most recent version)

- *Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment Interim Final* (EPA 1999)
- *Exposure Factors Handbook, Vol I, II and III* (EPA 1997b)
- *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors* (EPA 1991b)
- *Final Guidance for Data Usability in Risk Assessment* (EPA 1992a)
- *Dermal Exposure Assessment: Principals and Applications* (EPA 1992b)
- *Health Effects Assessment Summary Tables FY-1997 Annual* (EPA 1997c)
- *Integrated Risk Information System (on-line data base of toxicity measures)* (EPA 2001a, or most current version available after RI data is collected)
- *EPA Region IX Preliminary Remediation Goals* (EPA 2001b, or most current version available after RI data is collected)

Additional guidance which addresses site-specific issues and chemical contaminants will also be consulted.

CDM will prepare a human health risk assessment report that accurately establishes the site characteristics of the contaminated media, extent of contamination, and the physical boundaries of the contamination. Key contaminants will be selected based on persistence and mobility in the environment and the degree of hazard. CDM will evaluate key contaminants identified in the HHRA for receptor exposure and perform an estimate of the level of key contaminants reaching human receptors.

CDM will evaluate and assess the risk to humans posed by exposure to site contaminants. CDM will perform the following activities under this subtask, which will form the basis for the HHRA.

#### 5.7.1.1 Draft Human Health Risk Assessment Report

The draft risk assessment report will be submitted after EPA has approved the PAR, described in Section 5.1.13. The draft risk assessment report will cover the following:

<u>Hazard Identification (Sources)</u>

CDM will review all available sample information on the hazardous substances present at the site, and identify the major contaminants of concern. The final set of chemicals of potential concern to be used in the risk assessment will be selected in accordance with EPA Region II procedures as presented in RAGS Part A. Additional selection criteria that will be used to identify the COPCs at the site include the following:

- Frequency of detection in analyzed medium (e.g., groundwater)
- Historical site information/activities (i.e., site-related)
- Sample chemical detections relative to blank chemical detections
- Chemical concentration relative to upgradient and background concentrations
- Chemical toxicity (potential carcinogenic and noncarcinogenic effects, weight of evidence for potential carcinogenicity)
- Chemical properties (i.e., mobility, persistence and bioaccumulation)

- Significant exposure routes
- Risk-based concentration screen using EPA Region IX Risk Based Concentrations and media specific chemical concentrations (i.e., maximum concentrations)

In general, nutrients such as calcium, magnesium, potassium, and sodium are not quantitatively evaluated in the risk assessment as the potential toxicities of these minerals is significantly lower than other inorganics detected at the site and more data are available with respect to identifying dietary intake rather than toxicity.

Statistical analysis of the data will be performed (i.e., tests for normal distribution, calculation of upper confidence levels [UCLs]).

<u>Dose-Response Assessment</u>
The dose-response assessment will present the general toxicological properties of the selected COPCs using the most current toxicological human health effects data. Chemicals that cannot be quantitatively evaluated due to a lack of toxicity factors will not be eliminated as COPCs on this basis. These chemicals will instead be qualitatively addressed for consideration in risk management decisions for the site.

Toxicological values and information regarding the potential for carcinogens and noncarcinogens to cause adverse health effects in humans will be obtained from a hierarchy of EPA sources. The primary source will be EPA's Integrated Risk Information System (IRIS) on-line database. IRIS, which is updated regularly, provides chemical-specific toxicological values and information that have undergone peer review and represent an EPA scientific consensus. If toxicity values are not available from IRIS, the most recent Health Effects Assessment Summary Tables (HEAST) will be used to select toxicity values. EPA's National Center for Environmental Assessment (NCEA) may also be contacted to provide toxicity information if no data are available from IRIS or HEAST.

A slope factor is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime and is usually the upper 95 percent confidence limit of the slope of the dose-response curve expressed in $(mg/kg/day)^{-1}$. In risk assessment, a slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen.

For the evaluation of non-cancer effects in the risk assessment, chronic and subchronic reference doses (RfDs) are used. A chronic reference dose is an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without appreciable risk of deleterious effects during a lifetime. Chronic reference doses are generally used to evaluate the potential noncancer effects associated with exposure periods between six years and a lifetime. Subchronic reference doses aid in the characterization of potential non-cancer effects associated with shorter-term exposure (i.e., less than six years).

Toxicity endpoints/target organs for noncarcinogenic COPCs will be presented for those chemicals showing hazard quotients greater than one. If the hazard index is greater than one due to the summing of hazard quotients, segregation of the hazard index by critical effect and mechanism of action will be performed as appropriate.

Site Conceptual Model

CDM will develop a conceptual model for the site. The model will be used to identify potential or suspected sources of contamination, types and concentrations of contaminants detected at the site, potentially contaminated media, release mechanisms, and potential exposure pathways, including receptors.

When preparing the site conceptual model, the following factors will be considered:

- Sensitive populations, including but not limited to the elderly, pregnant or nursing women, infants and children, and people suffering from chronic illness
- People exposed to particularly high levels of contaminants
- Circumstances where a disadvantaged population is exposed to hazardous materials (i.e., Environmental Justice situations)
- Significant contamination sources
- Potential contaminant release mechanisms (e.g., volatilization, fugitive dust emissions, surface runoff/overland flow, tracking by humans, animals, soil gas generation, and biodegradation)
- Contaminant transport pathways such as direct air transport downwind, soil gas migration, and biomagnification in the food chain
- Cross media transfer effects, such as volatilization to air, wet deposition, dry deposition, and bioaccumulation in home grown vegetables

Exposure Assessment

Exposure assessment involves the identification of the potential human exposure pathways at the site for present and potential future-use scenarios. Potential release and transport mechanisms will be identified for contaminated source media. Exposure pathways will be identified that link the sources, locations, types of environmental releases, and environmental fate with receptor locations and activity patterns. Generally, an exposure pathway is considered complete if it consists of the following elements:

- A source and mechanism of release
- A transport medium
- An exposure point (i.e., point of potential contact with a contaminated medium)
- An exposure route (e.g., ingestion) at the exposure point

All present and future-use scenario exposure pathways considered will be presented; however, only some may be selected for quantitative analysis. Justifications will be provided for those exposure pathways retained and for those eliminated.

Based on the initial site visit and information regarding current and future land use, the potentially complete exposure pathways include:

**Future Use**

- Residents *(Adults and Children)*
  - Groundwater
    - Ingestion
    - Dermal
    - Inhalation of volatiles

**Current Use**

- Workers *(Adults)*
  - Air vapors
    - Inhalation of volatiles

Because groundwater is treated before use in the municipal water supply, current users are not considered potential receptors. However, residents will be evaluated as potential future receptors under the assumption that the treatment systems are removed in the future. Other water-supply users (e.g., workers, mall visitors) are also potential future receptors, but their exposures would be less than those of residents who use the water for drinking and showering. If vapor samples are collected from the basements of 100 and 200 Garden City Plaza, workers will be evaluated as potential receptors.

Exposure point concentrations will be developed for each COPC in the risk assessment for use in the calculation of daily intakes. The concentration is the 95 percent UCL on the arithmetic mean, or the maximum detected value (whichever is lower).

Daily intakes will be calculated for both chronic and subchronic exposures. These daily intakes will be used in conjunction with toxicity data to provide quantitative estimates of carcinogenic risk and non-cancer effects.

Exposure assumptions used in daily intake calculations will be based on information contained in EPA guidance, site-specific information, and professional judgement. These assumptions are generally 90th and 95th percentile parameters, which represent the reasonable maximum exposure (RME). The RME is the highest exposure that is reasonably expected to occur at a site. If potential risks and hazards exceed EPA target levels then Central Tendency Exposures (CTE) will be evaluated using 50th percentile exposure variables.

The exposure assessment will identify the magnitude of actual or potential human exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. The assumptions will include information from the Standard Default Assumptions Guidance and the updated Exposure Factors Handbook. Site specific information will be used where appropriate to verify or refine these assumptions. In developing the exposure assessment, CDM will develop reasonable maximum estimates of exposure for both current land use conditions and potential land use conditions at the site.

### Risk Characterization

In this section of the risk assessment, toxicity and exposure assessments will be integrated into quantitative and qualitative expressions of carcinogenic risk and non-cancer hazards. The estimates of risk and hazard will be presented numerically in spreadsheets contained in an appendix.

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a life time as a result of exposure to a potential carcinogen. Per RAGS, the slope factor converts estimated daily intakes averaged over a lifetime directly to incremental risk of an individual developing cancer. This carcinogenic risk estimate is generally an upper-bound value since the slope factor is often an upper 95th percentile confidence limit of probability of response based on experimental animal data used in the multistage model.

The potential for non-cancer effects will be evaluated by comparing an exposure level over a specified time period with a reference dose derived for a similar exposure period. This ratio of exposure to toxicity is referred to as a hazard quotient. This hazard quotient assumes that there is a level of exposure below which it is unlikely even for sensitive populations to experience adverse health effects; however, this value should not be interpreted as a probability. Generally, the greater the hazard quotient is above unity, the greater the level of concern.

Carcinogenic risks and non-cancer hazard index (HI) values will be combined across chemicals and exposure pathways as appropriate. In general, EPA recommends a target value or risk range (i.e., HI = 1 for non-cancer effects or cancer risk = $1\times10^{-4}$ to $1\times10^{-6}$) as threshold values for potential human health impacts. The results presented in the spreadsheet calculations will be compared to these target levels and discussed. Characterization of the potential risks associated with the site provides the EPA risk manager with a basis for determining whether additional response action is necessary at the site and a basis for determining residual chemical levels that are adequately protective of human health.

### Identification of Limitations/Uncertainties

In any risk assessment, estimates of potential carcinogenic risk and non-cancer health effects have numerous associated uncertainties. The primary areas of uncertainty and limitations will be qualitatively discussed. Quantitative measures of uncertainty will involve the calculation of central tendencies. Central tendency evaluation involves the use of 50th percentile input parameters in risk and hazard estimates as opposed to 90th percentile parameters used in the RME calculations. The 50th percentile parameters are considered representative of the general receptor population, but may underestimate the true health risk to sensitive receptors. The chemicals driving the risk assessment will be evaluated using these average exposure assumptions and the 95 percent UCL concentration to derive risk. The central tendency risks will be discussed in relation to RME risks. Central tendency analyses will only be calculated for pathways in which RME risks are considered above *de minimus* levels (carcinogenic risk above $1x10^{-6}$ and/or HI above 1.0).

CDM SM will coordinate with the EPA RPM and submit draft/interim deliverables as outlined in the Risk Assessment Guidance for Superfund - Part D. All data will be presented in RAGS Part D Format. The risk assessment will provide adequate details of the activities and be presented so that individuals not familiar with risk assessment can easily follow the procedures.

#### 5.7.1.2 Final Human Health Risk Assessment Report

CDM will submit the final human health risk assessment report, incorporating EPA review comments.

### 5.7.2 Screening Level Ecological Risk Assessment

CDM will conduct a qualitative ecological risk assessment as an optional task, to be exercised at EPA's discretion. The ecological risk assessment will address the potential risks to sensitive ecological receptors from site contaminants in sediments, soils, and/or surface water at the site, especially in areas that are identified as likely to receive discharge from site groundwater.

This assessment will be prepared in accordance with the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final)* (EPA 1997).

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario. The screening ecological risk assessment is composed of these four components as listed in order:

- Problem Formulation - a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study.
- Exposure Assessment - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations.
- Ecological Effects Assessment - literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors.
- Risk Characterization - measurement or estimation of both current and future adverse effects.

#### 5.7.2.1 Problem Formulation

The problem formulation section will define the objectives and scope of the ecological risk assessment. Descriptions of site history, environmental setting, nature and extent of contamination, habitat characterization, and potential ecological receptors will be included.

CDM will select chemical contaminants of concern. The selection process is used to narrow the focus of the ecological risk assessment and serves to identify dominant site risk and to guide future remediation decisions. The selection process for each COPC will take into consideration the following:

- Environmental concentration
- Physical/chemical properties, including bioavailability or presence of chemical form that can affect organisms, and effects of pH on chemical migration and uptake by plants and wildlife
- Potential for bioaccumulation or bioconcentration
- Toxicity characteristics and potency (amount of toxicant capable of producing adverse effects)
- Comparison to applicable and relevant and appropriate requirements and applicable to-be-considered guidelines

It should be noted that chemicals cannot be eliminated as COPCs due to the chemical's frequency of occurrence or by comparison to background reference condition concentrations. Therefore, frequency of detection and reference condition levels will not be factors in the selection of COPCs for the ecological risk assessment.

Site-related receptor species or surrogates will be chosen as ecological representatives of the trophic levels and habitats on and surrounding the site. Selection will be based on an integration of the types and distribution of COPCs, habitats, range and feeding habits of the potential ecological receptors, and relationships between the observed/expected species in the areas of concern. Other considerations include species that are Trustee or regulatory concerns.

The assessment endpoint for the ecological risk assessment is the disruption of ecological community structures via reduction of ecological populations. It will be assumed that a reduction of an ecological population may occur through the loss of normally-functioning individuals of the population. Assessment endpoints will be evaluated through wildlife measurement endpoints. Measurement endpoints to evaluate potential ecological impacts will be benchmark toxicity endpoints from the literature. Individual toxicity endpoints such as survival, reproductive effects, and growth impacts will be considered.

#### 5.7.2.2 Exposure Assessment

The purpose of the exposure assessment section is to evaluate the potential for receptor exposure to chemical constituents at the site. This evaluation involves identification of contaminant exposure pathways that may be of concern for ecological receptors and determination of the magnitude of exposure to the selected ecological receptors. A conceptual site model (simplified food web noting dominant contaminant transfer pathways) will be included.

#### 5.7.2.3 Ecological Effects Assessment

The toxicity assessment will link potential contaminant exposure point concentrations to adverse effects in the selected ecological receptors. The goal of the toxicity assessment is to allow determination of the toxic effects of site COPCs on selected receptors.

CDM will seek and utilize benchmark toxicity values in this assessment. CDM will perform a database search to identify benchmark toxicity values for COPCs. Data sources that will be reviewed may include:

- ECOTOXicology Database System (ECOTOX)
- Registry of Toxic Effects of Chemical Substances (RTECS)
- Integrated Risk Information System

CDM will also obtain benchmark toxicity values from open literature sources.

#### 5.7.2.4 Risk Characterization
Risk characterization will evaluate the evidence linking site contamination with adverse ecological effects. Risk characterization will integrate the exposure assessment with the toxicity assessment. Characterization of risk to site ecological receptors will be determined on the basis of comparison of ecotoxicological benchmark values from the literature with exposure doses (hazard index approach).

#### 5.7.2.5 Uncertainties and Limitations
To produce any risk assessment, it is necessary to make assumptions. Assumptions carry with them associated uncertainties which must be identified so that risk estimates can be put into perspective. CDM will discuss uncertainties and limitations associated with the ecological risk assessment.

## 5.8 Task 8 - Treatability Studies/Pilot Testing
Applicable treatment technologies that may be suitable for the Roosevelt site will be identified to determine if there is a need to conduct treatability studies.

### 5.8.1 Literature Search
CDM will research viable technologies that may be applicable to the contaminants of concern and the site conditions encountered. Upon completion of the literature search, CDM will provide a technical memorandum to the EPA RPM that summarizes the results. As part of this document, CDM will submit a plan that recommends performance of a treatability study at one of the above levels and identifies the types and specific goals of the study. The treatability study will be designed to determine the suitability of remedial technologies to site conditions and addressing the type of contamination that exists at the site. If directed by EPA, CDM will prepare an addendum to the RI/FS work plan for the treatability study.

### 5.8.2 Treatability Study Work Plan
As directed by EPA, this subtask is not applicable.

### 5.8.3 Conduct Treatability Studies
As directed by EPA, this subtask is not applicable.

### 5.8.4 Treatability Study Report

As directed by EPA, this subtask is not applicable.

## 5.9 Task 9- Remedial Investigation Report

CDM will develop and submit a remedial investigation report that accurately establishes site characteristics including the identification of contaminated media, definition of the extent of contamination in groundwater, and delineation of the physical boundaries of contamination. CDM will obtain detailed sampling data to identify key contaminants and determine the movement and extent of contamination in the environment. Key contaminants will be identified in the report and will be selected based on toxicity, persistence, and mobility in the environment.

### 5.9.1 Draft Remedial Investigation Report

A draft RI report will be prepared in accordance with the format described in EPA guidance documents such as the "*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*". A draft outline of the report, adapted from the 1988 guidance, is shown in Table 5-3. This outline should be considered a draft and subject to revision, based on the data obtained. EPA's SOW for this work assignment has provided a detailed description of the types of information, maps, and figures to be included in the RI report. CDM will incorporate such information to the fullest extent practicable.

Upon completion, the draft RI report will be submitted for review by a CDM Technical Review Committee (TRC), followed by a quality assurance review. It will then be submitted to EPA for formal review and comment.

### 5.9.2 Final Remedial Investigation Report

Upon receipt of all EPA, other federal and state agency written comments, CDM will revise the report and submit the amended report to EPA. When EPA determines that the report is acceptable, the report will be deemed the final RI report.

## 5.10 Task 10 - Remedial Alternatives Screening

This task covers activities for the development of appropriate remedial alternatives that will undergo full evaluation.. A range of alternatives will be considered, including innovative treatment technologies, consistent with the regulations outlined in the National Contingency Plan (NCP), 40 CFR Part 300, the "*Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*" *(OSWER Directive 9355.3-01 October 1988)* or latest version, and other OSWER directives including 9355.4-03, October 18, 1989, and 9283.1-06, May 27, 1992, "*Considerations in Ground Water Remediation at Superfund Sites*", as well as other applicable and more recent policies or guidance. CDM will also use EPA's 1996 final guidance *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Groundwater at CERCLA Sites,* which describes strategies and technologies for groundwater contaminated with chlorinated solvents.

CDM will investigate only those alternatives that will remediate or control contaminated media (i.e., groundwater) related to the site, as defined in the RI, to provide adequate protection of human health and the environment. The potential alternatives will encompass, as appropriate, a range of alternatives in which treatment is used to reduce the toxicity, mobility, or volume of wastes but vary in the degree to which long-term management of residuals or untreated waste is required, and will include one or more alternatives involving containment with little or no treatment, as well as a no-action alternative.

Based on EPA's presumptive remedy guidance (1996), the following alternatives, composed of treatment technologies that are likely to be deemed appropriate for chlorinated VOCs, are anticipated:

- No Action
- Groundwater treatment with air stripping
- Groundwater treatment with granular activated carbon
- Groundwater treatment with chemical/ultraviolet (UV) oxidation
- Groundwater treatment with aerobic biological reactors
- Monitored natural attenuation
- Indoor vapor treatment

Additional technologies may be evaluated if extremely high levels of contamination (e.g., DNAPL) are identified. Remedial alternatives will also include several disposal options for treated groundwater (e.g., recharge basins, discharge to the local publically owned treatment works).

Based on the established remedial response objectives and the results of the risk assessment (Task 7), the initial screening of remedial alternatives will be performed according to the procedures recommended in "*Interim Final Guidance for Conducting RI/FS under CERCLA*" (EPA 1988a).

The alternatives will be screened qualitatively against three criteria: effectiveness, implementability, and relative cost. A brief description of the application of these criteria is as follows:

- <u>Effectiveness</u> - The evaluation focuses on the potential effectiveness of technologies in meeting the remedial action goals; the potential impacts to human health and the environment during construction and implementation; and how proven and reliable the process is with respect to the contaminants and conditions at the site.

- <u>Implementability</u> - This evaluation encompasses both the technical and administrative feasibility of the technology. It includes an evaluation of treatment requirements, waste management, and relative ease or difficulty in achieving the operation and maintenance requirements. Technologies that are clearly unworkable at the site are eliminated.

- Relative Cost - Both capital cost and operation and maintenance cost are considered. The cost analysis is based upon engineering judgement, and each technology is evaluated as to whether costs are high, moderate, or low relative to other options within the same category.

The screening evaluation will generally focus upon the effectiveness criterion, with less emphasis on the implementability and relative cost criteria. Technologies surviving the screening process are those that are expected to achieve the remedial action objectives for the site, either alone or in combination with others.

### 5.10.1 Technical Memorandum

CDM will prepare a draft remedial alternatives screening memorandum that will document all of the analyses and evaluations described above. This draft memorandum will be submitted to EPA for formal review and comment and will:

- Establish Remedial Action Objectives - Based on existing information, CDM will identify site-specific remedial action objectives that should be developed to protect human health and the environment. The objectives will specify the contaminant(s) and media of concern, the exposure route(s) and receptor(s), and an acceptable contaminant level or range of levels for each exposure route (i.e., preliminary remediation goals).

- Establish General Response Actions - CDM will develop general response actions for each medium of interest by defining contaminant, treatment, excavation, pumping, or other actions, singly or in combination to satisfy remedial action objectives. The response actions will take into account requirements for protectiveness as identified in the remedial action objectives and the chemical and physical characteristics of the site.

- Identify and Screen Applicable Remedial Technologies - CDM will identify and screen technologies based on the general response actions. Hazardous waste treatment technologies will be identified and screened to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other site characteristics will be considered. This screening will be based primarily on a technology's ability to address the contaminants at the site effectively, but will also take into account that technology's implementability and cost. CDM will select representative process options, as appropriate, to carry forward into alternative development and will identify the need for treatability testing for those technologies that are probable candidates for consideration during the detailed analysis.

- Develop Remedial Alternatives in accordance with the NCP

- Screen Remedial Alternatives for Effectiveness, implementability, and Cost - CDM will screen alternatives to identify the potential technologies or process options that will be combined into media-specific or site-wide alternatives. The developed alternatives will be defined with respect to size and configuration of the representative process options, time for remediation, rates of flow or treatment, spatial requirements, distances for disposal, required permits, imposed limitations, and other factors necessary to evaluate the alternatives. If many distinct viable options are available and developed, CDM will screen the alternatives undergoing detailed analysis to provide the most promising process options.

### 5.10.2 Final Technical Memorandum

As directed by EPA, this subtask is not applicable.

## 5.11 Task 11 - Remedial Alternatives Evaluation

Remedial technologies passing the initial screening process will be grouped into remedial alternatives. This task covers efforts associated with the assessment of individual alternatives against each of the nine current evaluation criteria and a comparative analysis of all options against the evaluation criteria. The analysis will be consistent with the NCP, 40 CFR Part 300, and will consider the "*Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA*" (OSWER Directive 9355.3-01) and other pertinent OSWER guidance. The detailed evaluation criteria for remedial alternatives are listed on Table 5-4 and a brief description of each criterion is provided:

- Overall Protection of Human Health and the Environment - This criterion provides a final check to assess whether each alternative meets the requirement that it is protective of human health and the environment. The overall assessment of protection is based on a composite of factors assessed under the evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

- Compliance with ARARs - This criterion is used to determine how each alternative complies with applicable or relevant and appropriate Federal and State requirements, as defined in Section 121 of CERCLA 42 USC Section 9621.

- Long-Term Effectiveness - This criterion addresses the results of a remedial action in terms of the risk remaining at the Site after the response objectives have been met. The primary focus of this evaluation is to determine the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. The factors to be evaluated include the magnitude of remaining risk (measured by numerical standards such as cancer risk levels), and the adequacy, suitability and long-term reliability of management controls for providing continued protection from residuals (i.e., assessment of potential failure of the technical components).

- Reduction of Toxicity, Mobility, or Volume - This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of the contaminants. The factors to be evaluated include the treatment process employed, the amount of hazardous material destroyed or treated, the degree of reduction expected in toxicity, mobility or volume, and the type and quantity of treatment residuals.

- Short-Term Effectiveness - This criterion addresses the effects of the alternative during the construction and implementation phase until the remedial actions have been completed and the selected level of protection has been achieved. Each alternative is evaluated with respect to its effects on the community and onsite workers during the remedial action, environmental impacts resulting from implementation, and the amount of time until protection is achieved.

- Implementability - This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. Technical feasibility considers construction and operational difficulties, reliability, ease of undertaking additional remedial action (if required), and the ability to monitor its effectiveness. Administrative feasibility considers activities needed to coordinate with other agencies (e.g., state and local) in regard to obtaining permits or approvals for implementing remedial actions.

- Cost - This criterion addresses the capital costs, annual operation and maintenance costs, and present worth analysis. Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs. Direct costs include expenditures for the equipment, labor and material necessary to perform remedial actions. Indirect costs include expenditures for engineering, financial and other services that are not part of actual installation activities but are required to complete the installation of remedial alternatives. Annual operation and maintenance costs are post-construction costs necessary to ensure the continued effectiveness of a remedial action. These costs will be estimated to provide an accuracy of +50 percent to -30 percent. A present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the current year. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that would be sufficient to cover all costs associated with the remedial action over its planned life.

- State Acceptance - This criterion evaluates the technical and administrative issues and concerns the State may have regarding each of the alternatives. The factors to be evaluated include those features of alternatives that the State supports, reservations of the State, and opposition of the State.

- Community Acceptance - This criterion incorporates public concerns into the evaluation of the remedial alternatives. Often, community (and also state) acceptance cannot be determined during development of the RI/FS. Evaluation of these criteria is postponed until the RI/FS report has been released for state and public review. These criteria are then addressed in the ROD and the responsiveness summary.

Each remedial alternative will be subject to a detailed analysis according to the above evaluation criteria. A comparative analysis of all alternatives will then be performed to evaluate the relative benefits and drawbacks of each according to the same criteria. A preferred remedial alternative will be recommended based upon the results of the comparative analysis.

### 5.11.1 Technical Memorandum

CDM will prepare a draft technical memorandum that addresses the following:

- A technical description of each alternative that outlines the waste management strategy involved and identifies the key ARARs associated with each alternative.

- A discussion that describes the performance of that alternative with respect to each of the evaluation criteria. A table will be provided summarizing the results of this analysis. Once the individual analysis is completed, a comparison and contrast of the alternatives to one another, with respect to each of the evaluation criteria, will be performed.

This draft memorandum will be submitted to EPA for formal review and comment.

### 5.11.2 Final Technical Memorandum

As directed by EPA, this subtask is not applicable.

## 5.12 Task 12 - Feasibility Study Report

CDM will develop a feasibility study report consisting of a detailed analysis of alternatives and a cost-effectiveness analysis, in accordance with the NCP, 40 CFR Part 300, as well as the most recent guidance.

### 5.12.1 Draft Feasibility Study Report

CDM will submit a draft feasibility study report to the EPA. The FS report will contain the following:

- Summary of feasibility study objectives
- Summary of remedial objectives
- Identification of general response actions
- Identification and screening of remedial technologies
- Remedial alternatives description
- Detailed analysis of remedial alternatives
- Summary and conclusions

The technical feasibility considerations will include the careful study of any problems that may prevent a remedial alternative from mitigating site problems. Therefore, the site characteristics from the RI will be kept in mind as the technical feasibility of the alternative is studied. Specific items to be addressed will be reliability (operation over time), safety, operation and maintenance, ease with which the alternative can be implemented, and time needed for implementation.

The draft FS report will be prepared to: 1) summarize the activities performed and 2) present the results and associated conclusions for Tasks 1 through 11. The report will include a summary of a description of the initial screening study process and the detailed evaluations of the remedial action alternatives studied. The FS report format is shown on Table 5-5 and will consist of an executive summary and five sections. The executive summary will be a brief overview of the FS and the analysis underlying the remedial actions that were evaluated. The five sections will be as follows:

- Introduction and Site Background
- Identification and Screening of Remedial Technologies
- Development and Initial Screening of Remedial Alternatives
- Description and Detailed Analysis of Alternatives
- Comparative Analysis of Alternatives

The FS report will be reviewed by a CDM TRC. TRC comments will be addressed prior to submittal to EPA for review.

### 5.12.2 Final Feasibility Study Report

Upon receipt of all EPA and other federal and state agency written comments, CDM will revise the FS report and submit the amended document to EPA. When EPA determines that the document is acceptable, the FS report will be deemed the final FS report.

## 5.13 Task 13 - Post RI/FS Support

### 5.13.1 FS Addendum

CDM will prepare an FS addendum (if required), based on the final ROD adopted for the site, covering issues arising after finalization of the basic RI/FS documents.

### 5.13.2 Technical Support

CDM will provide several types of technical support to EPA, including: technical meetings; review of presentation materials; technical support on the draft and final Responsiveness Summary, Proposed Plan, and ROD; attendance by project staff at briefings; additional PRP searches; and general technical support during the ROD period.

## 5.14 Task 14 - Negotiation Support

In accordance with the SOW, this task is currently not applicable to this work assignment.

## 5.15 Task 15 - Administrative Record

In accordance with the SOW, this task is currently not applicable to this work assignment.

## 5.16 Task 16 - Work Assignment Closeout

Project closeout includes work efforts related to the project completion and closeout phase. Project records will be transferred to EPA. A Work Assignment Closeout Report (WACR) will be completed.

### 5.16.1 Work Assignment Closeout Report (WACR)

CDM will prepare a WACR that will include all level-of-effort hours, by professional level, and costs in accordance with the project work breakdown structure.

### 5.16.2 Document Indexing

CDM will organize the work assignment files in its possession in accordance with the currently approved file index structure.

### 5.16.3 Document Retention/Conversion

CDM will convert all pertinent paper files into an appropriate long-term storage format. EPA will define the specific long-term storage format prior to closeout of this work assignment.

# Section Six

# Section 6
# Schedule

A project schedule for the RI/FS is includes as Figure 6-1. The project schedule is based on assumptions for durations and conditions of key events occurring on the critical and non-critical path. These assumptions are as follows:

- The schedule for the field activities is dependent on access to all properties being obtained by EPA without difficulty.
- Field activities will not be significantly delayed due to severe weather conditions (snow and icing conditions, hurricanes).
- The schedule for the field activities is dependent on timely review and approval of the work plan and QAPP and the provision of adequate funding by EPA.
- The schedule for the field investigation is dependent on all field activities being performed in Level D or Level C health and safety protection.
- CDM will receive validated data for analyses performed by EPA's Contract Laboratory Program 8 weeks after sample collection.

# 7 Section Seven

# Section 7
# Project Management Approach

## 7.1 Organization and Approach

The proposed project organization is shown in Figure 7-1.

The SM, Ms. Susan Schofield, P.G., has primary responsibility for plan development and implementation of the RI, including coordination with the task leader and support staff, development of bid packages for subcontractor services, acquisition of engineering or specialized technical support, and all other aspects of the day-to-day activities associated with the project. The SM identifies staff requirements, directs and monitors site progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

The RI task leader/project hydrogeologist, Ms. Lisa Campbell, reports to and will work directly with the SM to develop and coordinate the work plan, QAPP, staffing and physical resource requirements, and technical statements of work for professional subcontractor services. She will be responsible for the implementation of the field investigation, performance tracking of the CDM subcontractor laboratory, the analysis, interpretation and presentation of data acquired relative to the site, preparation of the data evaluation summary report, and the RI report.

The FS task leader, Mr. Thomas Mathew, P.E., will work closely with the RI task leader/project hydrogeologist to ensure that the field investigation generates the proper type and quantity of data for use in the initial screening of remedial technologies/alternatives, detailed evaluation of remedial alternatives, development of requirements for and evaluation of treatability study/pilot testing, if required, and associated cost analysis. The FS report will be developed by the FS technical group.

The field team leader (FTL), Ms. April Caruso, is responsible for on-site management for the duration of all site operations including the activities conducted by CDM such as equipment mobilization, sampling, and the work performed by subcontractors such as surveying.

The regional quality assurance coordinator (RQAC) is Ms. Jeniffer Oxford. The RQAC is responsible for overall project quality including development of the QAPP, review of specific task QA/QC procedures, and auditing of specific tasks. The RQAC reports to the CDM quality assurance director (QAD).

The RAC II QAD, Mr. George DeLullo is responsible for overall project quality, and will have approved quality assurance coordinators (QACs) perform the required elements of the RAC II QA program of specific task QA/QC procedures, and auditing of specific tasks at established intervals. These QACs report to CDM's corporate QA director and are independent of the SM's reporting structure.

The analytical services coordinator (ASC), Mr. Scott Kirchner, will ensure that the subcontract analytical laboratory will perform analyses as described in the QAPP. The ASC provides assistance with meeting EPA sample management and paperwork requirements.

The task numbering system for the RI/FS effort is described in Section 5 of this work plan. Each of these tasks has been scheduled and will be tracked separately during the course of the RI/FS work. For the RAC II contract, the key elements of the monthly progress report will be submitted within 20 calendar days after the end of each reporting period and will consist of a summary of work completed during that period and associated costs.

Project progress meetings will be held, as needed, to evaluate project status, discuss current items of interest, and review major deliverables such as the work plan, QAPP, the data evaluation summary report, the RI report, the human health risk assessment, and the FS report.

## 7.2 Quality Assurance and Document Control

All work by CDM on this work assignment will be performed in accordance with the CDM RAC II Quality Management Plan (QMP) (December 2003).

The RAC II RQAC will maintain QA oversight for the duration of the work assignment. A CDM QAC has reviewed this work plan for QA requirements. It has been determined that a QAPP governing field sampling and analysis is required. It will be prepared in accordance with EPA R-5 and EPA Region II requirements. It will be submitted to an approved QAC for review and approval before submittal to EPA. Any reports for this work assignment which present measurement data generated during the work assignment will include a QA section addressing the quality of the data and its limitations. Such reports are subject to QA review following technical review. Statements of work for subcontractor services and subcontractor bids and proposals will receive technical and QA review.

The CDM SM is responsible for implementing appropriate QC measures on this work assignment. Such QC responsibilities include:

- Implementing the QC requirements referenced or defined in this work plan and in the QAPP
- Adhering to the CDM RAC Management Information System (RACMIS) document control system
- Organizing and maintaining work assignment files
- Conducting field planning meetings, as needed, in accordance with the RAC II QMP
- Completing measurement and test equipment forms that specify equipment requirements

Technical and QA review requirements as stated in the QMP will be followed on this work assignment.

Document control aspects of the program pertain to controlling and filing documents. CDM has developed a program filing system that conforms to EPA's requirements to ensure that the documents are properly stored and filed. This guideline will be implemented to control and file all documents associated with this work assignment. The system includes document receipt control procedures, a file review, an inspection system, and file security measures.

The RAC II QA program (QMP, Table 9-1) includes both self-assessments and independent assessments as checks on quality of data generated on this work assessment. Self assessments include management system audits, trend analyses, calculation checking, data validation, and technical reviews. Independent assessments include office, field and laboratory audits and the submittal of performance evaluation samples to laboratories.

One QA internal system audit and one field technical system audit are required. A laboratory technical system audit may be conducted by the CDM QA staff. Performance audits (i.e., performance evaluation samples) may be administered by CDM as required for any analytical parameters. An audit report will be prepared and distributed to the audited group, to CDM management, and to EPA. EPA may conduct or arrange a system or performance audit.

## 7.3 Project Coordination

The SM will coordinate all project activities with the EPA RPM. Regular telephone contact will be maintained to provide updates on project status. Field activities at the site will require coordination among federal, state, and local agencies and coordination with involved private organizations. Coordination of activities with these stakeholders is described below.

EPA is responsible for overall direction and approval of all activities for the Roosevelt site. EPA may designate technical advisors and experts from academia or its technical support branches to assist on the site. Agency advisors could provide important sources of technical information and review, which the CDM team will use from initiation of RI/FS activities through final reporting.

Sources of technical information include EPA, NYSDEC, USGS, Nassau County Health Department, and sampling conducted during previous investigations. These sources can be used for background information on the site and surrounding areas.

The state, through NYSDEC, may provide review, direction, and input during the RI/FS. EPA's RPM will coordinate contact with NYSDEC personnel.

Local agencies that may be involved include the Nassau County Department of Health, the local water districts, and local departments such as planning boards, zoning and building commissions, police, fire, health departments, and utilities (water and sewer). Contacts with these local agencies will be coordinated through EPA.

Private organizations requiring coordination during the RI/FS include residents in the area and public interest groups such as environmental organizations and the press. Coordination with these interested parties will be performed through EPA.

# Section Eight

# Section 8
# References

CDM Federal Programs Corporation (CDM). 2003. RAC II Quality Management Plan, December.

Citizens Campaign for the Environment. 1993. A Public Health Hazard: Contaminated Drinking Water. June.

The Climate Diagnostics Center Web Site. 2000. CDC Climate Research Data and Resources, United States Climate Information, United States Interactive Climate Pages. URL: http://www.cdc.noaa.gov/USclimate/ Document maintained by Cathy Smith (cas@cdc.noaa.gov). Updated September 19, 2000.

Cohen, P., Franke, O.L., and Foxworthy, B.L., 1968. An atlas of Long Island's Water Resources. *New York State Water Resources Commission Bull.* 62, 117 p.

Eckhardt, David A. and Kenneth A. Pearsall. 1989. Chlorinated Organic Compounds in Ground Water at Roosevelt Filed, Nassau County, Long Island, New York. United States Geological Survey Water-Resources Investigations Report 86-4333.

Eckhardt, D.A.V., W.J. Flipse, and E.T. Oaksford. 1989. Relation between Land Use and Ground-Water Quality in the Upper Glacial Aquifer in Nassau and Suffolk Counties, Long Island, New York. *USGS Water-Resources Investigations Report* 86-4142.

Environmental Protection Agency (EPA). 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final. Office of Solid Waste and Emergency Response, Washington, DC. EPA/540/G-89/004. OSWER Directive 9355.3-01.

_______ 1989a. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual Part A. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington DC. EPA/540/1-89/002. OSWER Directive 9285.701A. NTIS PB90-155581.

_______ 1991a. RAGS: Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Office of Emergency and Remedial Response. EPA/540/R-92/003.

_______ 1991b. RAGS Volume I: Human Health Evaluation Manual Supplemental Guidance. Standard Default Exposure Factors. Office of Solid Waste and Emergency Response Directive 9285.6-03. March 25, 1991.

_______ 1992a. Final Guidance On Data Usability In Risk Assessment (Part A). Office Of Solid Waste And Emergency Response Directive 9285.7-09A.

_______ 1992b. Dermal Exposure Assessment: Principals And Applications. Office of Solid Waste And Emergency Response. EPA/600/8-91/011B.

_______ 1992c. Community Relations in Superfund: A Handbook, EPA-/540/92/009.

_______ 1993. Guide for Conducting Treatability Studies Under CERCLA November.

_______ 1994. Guidance for the Data Quality Objectives Process. EPA QA/G-4. Office of Research and Development. U. S. Environmental Protection Agency, Washington D.C. EPA/600/R-96/055. September.

_______ 1996. Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites. Final Guidance. Office of Solid Waste and Emergency Response. EPA 540/R-96/023 PB96-963508. October.

_______ 1997a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. Office of Solid Waste and Emergency Response; Washington, D.C. EPA 540-R-97-006. June.

_______ 1997b. Exposure Factors Handbook, Volumes I, II, and III. Office of Research and Development. EPA/600/P-95/002Fa, -002Fb, and 002Fc.

_______ 1997c. Health Effects Assessment Summary Tables FY-1997 Annual.

_______ 1998. RAGS: Human Health Evaluation Manual, Part D. Office of Emergency and Remedial Response. Interim Publication No. 9285.7-01D.

_______ 1998a. Final EPA Region II Groundwater Sampling Procedure Low Stress (Low Flow) Purging and Sampling. March 16.

_______ 1999. Risk Assessment Guidance For Superfund: Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment Interim Final.

_______ 2001a. Integrated Risk Information System (on-line database of toxicity measures). http://www.epa.gov/ngispgm3/iris/

_____ 2001b. Region 9 Preliminary Remediation Goals. http://www.epa.gov/region09/waste/sfund/prg/ index.htm

Franke, O.L. and P. Cohen. 1972. Regional rates of ground-water movement on Long Island, New York, _in_ U.S. Geological Survey Research, 1972:*USGS Professional Paper* 800-C, p. C271-277.

Franke, O.L. and N.E. McClymonds. 1972. Summary of the Hydrologic Situation on Long Island, New York, as a Guide to Water-Management Alternatives. *Geological Survey Professional Paper* 627-F, 59 pp.

Geraghty and Miller, Inc. 1986. Roosevelt Field Ground-water Contamination Study for the Nassau County Department of Health, Long Island, New York. May.

Holzmacher, McLendon & Murrell. 1993. Field Report Summary New York State Superfund Standby Contract Garden City Schools Field Investigation Garden City, New York. Prepared for New York State Department of Environmental Conservation. September.

McClymonds, N.E., and Franke, O.L. 1972. Water-Transmitting Properties of Aquifers on Long Island, New York. *Geological Survey Professional Paper* 627-E, 24 pp.

Nassau County Department of Health and Dvirka and Bartilucci. 1986. Investigation of Contaminated Aquifer Segments Nassau County, NY. June

Roy F. Weston. 2000. Hazard Ranking System Documentation Package Old Roosevelt Field Contaminated GW Area, Garden City, Nassau County, New York. January.

Smolensky, D.A, Buxton, H.T, and Shernoff, P.K., 1989. Hydrogeologic Framework of Long Island, New York. *USGS Hydrologic Investigations Atlas* HA-709, 3 Sheets.

URS Dames & Moore. 2000. Phase I Environmental Assessment Garden City Plaza 100, 200, 300 Ring Road, Garden City, New York. Prepared for Bressler, Amery & Ross. August 16.

U.S. Census Bureau (Census). 1995. 1990 U.S. Census Lookup. URL: http://venus.census.gov/ cdrom/lookup. Last revised July 20.

# 9 Section Nine

# Section 9
# Glossary of Abbreviations

| | |
|---|---|
| ARARs | Applicable or Relevant and Appropriate Requirements |
| ASC | Analytical Services Coordinator |
| bgs | Below ground surface |
| CAMP | Community air monitoring plan |
| CDM | Camp Dresser & McKee Inc. |
| CDM | CDM Federal Programs Corporation |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act of 1980 |
| CFR | Code of Federal Regulations |
| CLASS | Contract Laboratory Analytical Support Services |
| CLP | Contract Laboratory Program |
| COPC | Chemical of Potential Concern |
| CRP | Community Relations Plan |
| CTE | Central Tendency Exposure |
| DCE | Cis-1,2-dichloroethene |
| DESA | Division of Environmental Services |
| DNAPL | Dense Non-Aqueous Phase Liquid |
| DOT | Department of Transportation |
| DQI | Data Quality Indicator |
| DQO | Data Quality Objective |
| ECOTOX | ECOTOXicology Database System |
| Eh | Oxidation-Reduction Potential |
| EPA | United States Environmental Protection Agency |
| EPC | Exposure point concentration |
| EQuIS | Environmental Quality Information Systems |
| ERAGS | Ecological Risk Assessment Guidance for Superfund |
| EVS | Environmental Visualization Software |
| FS | Feasibility Study |
| ft/d | Feet per day |
| FTL | Field Team Leader |
| GIS | Geographic Information System |
| gpd per ft | Gallons per day per foot |
| gpd per sq ft | Gallons per day per square foot |
| HEAs | Health Effects Assessment |
| HEAST | Health Effects Assessment Summary Tables |
| HHRA | Human Health Risk Assessment |
| HI | Hazard Index |
| HRS | Hazard Ranking System |
| HSP | Health and Safety Plan |
| IDW | Investigation Derived Waste |
| IFB | Invitation For Bid |
| IRIS | Integrated Risk Information System |
| LOE | Level of Effort |

| | |
|---|---|
| MCL | Maximum Contaminant Level |
| MCLG | Maximum Contaminant Level Goal |
| mgd | Million gallons per day |
| mg/kg | Milligrams per kilogram |
| MNA | Monitored natural attenuation |
| msl | Mean Sea Level |
| NAS | Naval Air Facility |
| NCEA | National Center for Environmental Assessment |
| NCDH | Nassau County Department of Health |
| NCDPW | Nassau County Department of Public Works |
| NCP | National Contingency Plan |
| NESHAPs | National Emission Standards for Hazardous Air Pollutants |
| NPDES | National Pollution Discharge Elimination System |
| NYCRR | New York Code of Requirements and Regulations |
| NYSDOH | New York State Department of Health |
| NYSDEC | New York State Department of Environmental Conservation |
| OSWER | Office of Solid Waste and Emergency Response |
| PAR | Pathway Analysis Report |
| PCBs | Polychlorinated Biphenyl |
| PCE | Tetrachloroethene |
| POTW | Publically Owned Treatment Works |
| ppb | Parts per billion |
| PRGs | Preliminary Remediation Goals |
| QA/QC | Quality Assurance/Quality Control |
| QAC | Quality Assurance Coordinator |
| QAD | Quality Assurance Director |
| QAPP | Quality Assurance Project Plan |
| QMP | Quality Management Plan |
| RA | Risk Assessment |
| RAC | Response Action Contract |
| RACMIS | RAC Management Information System |
| RAGS | Risk Assessment Guidance for Superfund |
| RAS | Routine Analytical Services |
| RCRA | Resource Conservation and Recovery Act |
| RfD | Reference dose |
| RFP | Request for Proposal |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| RME | Reasonable maximum exposure |
| ROD | Record of Decision |
| Roosevelt | Old Roosevelt Field Contaminated Groundwater Area Site |
| RPM | Remedial Project Manager |
| RQAC | Regional Quality Assurance Coordinator |
| RSCC | Regional Sample Control Center |
| RTECS | Registry of Toxic Effects of Chemical Substances |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SM | Site Manager |
| SMO | Sample Management Office |

| | |
|---|---|
| SOP | Standard Operating Procedures |
| SOW | Statement of Work |
| SVP | Sampling vertical profile |
| TAL | Target Analyte List |
| TBC | "To Be Considered" Material |
| TCE | Trichloroethene |
| TCL | Target Compound List |
| the site | Old Roosevelt Field Contaminated Groundwater Area Site |
| TOC | Total organic carbon |
| TOG | Technical Operations Guidance series |
| TRC | Technical Review Committee |
| UCL | Upper Confidence Limit |
| μg/l | Micrograms/liter |
| USC | United States Code |
| USGS | United States Geological Survey |
| UV | Ultraviolet |
| VOC | Volatile Organic Compound |
| WACR | Work Assignment Close-Out Report |
| 1,1-DCE | 1,1-dichloroethene |

Tables

Table 4-1

## Summary of Data Quality Levels
## Old Roosevelt Field Contaminated Groundwater Area Site
## Nassau County, New York

| Data Uses | Analytical Level (1) | Types of Analysis |
|---|---|---|
| Site characterization monitoring during implementation | Screening level with definitive level confirmation | - Total organic vapor using instruments<br>- Water quality field measurements using portable instruments |
| Risk assessment<br>Site Characterization<br>Monitoring during implementation | Definitive level | - Organics/Inorganics using EPA-approved methods<br>- CLP SOWs<br>- Standard water analyses<br>- Analyses performed by laboratory |
| Site characterization | DQO level<br>Field instrument (2) | - Measurements from field equipment<br>- Qualitative measurements |

(1) Definitions of analytical levels: Screening data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. Screening data provide analyte (or at least chemical class) identification and quantification, although the quantification may be relatively imprecise. For definitive confirmation, approximately 10 percent of the screening data are confirmed using analytical methods and quality control procedures and criteria associated with definitive data. Screening data without associated confirmation data are generally not considered to be data of known quality.

Definitive data are generated using rigorous analytical methods, such as EPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods generating definitive data produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Data may be generated at the site or at an off-site location, as long as the quality control requirements are satisfied. For the data to be definitive, either analytical or total measurement error must be determined.

(2) DQO = Measurement-specific Data Quality Objective requirements will be defined in the QAPP.

## Table 5-1

### Summary of Proposed Multi-port Well Locations
### Old Roosevelt Field Contaminated Groundwater Area Site
### Nassau County, New York

| No. | Location | Number of Ports | Rationale | Estimated Depth (ft bgs) |
|---|---|---|---|---|
| 1 | North side of Old Country Road | 10 | Background Well | 450 |
| 2 | South of 100 Ring Road West (near well N8050) | 10 | Potential source area, TVOCs 41,000 ug/L; well N8050 screened at 300-328 ft bgs | 450 |
| 3 | West of mall entrance (near well N5486) | 10 | Deep supply well, TVOCs 170 ug/L; well N5486 screened at 450-556 ft bgs | 450 |
| 4 | West of 100/200 Garden City Plaza | 10 | Old drain field location, used for discharge of contaminated cooling water | 450 |
| 5 | West of 300 Garden City Plaza (near well N9310) | 10 | Potential source area, TVOCs 1,500 ug/L; well N9310 screened 180-230 bgs | 450 |
| 6 | Corner of Garden Street and Tremont Street, Village of Garden City | 6 | Downgradient nature and extent of contamination; outpost well for Hempstead well field | 450 |
| 7 | Corner of Chestnut Street and Prospect Avenue, Village of Garden City | 6 | Downgradient nature and extent of contamination; outpost well for Hempstead well field | 450 |
| 8 | Corner of Clinton Road and Pine Street, Village of Garden City | 6 | Downgradient nature and extent of contamination; outpost well for Hempstead well field | 450 |

Abbreviations: ft bgs = feet below ground surface; TVOCs = total volatile organic compounds; ug/L = micrograms per liter

300225

## Table 5-2

### Summary of Sampling and Analysis Program
### Old Roosevelt Field Contaminated Groundwater Area Site
### Nassau County, New York

| Sample Locations | Sample Matrix | Field Parameters | CLP Analytical Parameters | Subcontract Lab Analytical Parameters | Number of Samples (1) | Sample Frequency/Intervals |
|---|---|---|---|---|---|---|
| **Groundwater Screening Samples** | | | | | | |
| 8 Vertical Profile Borings | GW | DO, Eh, Turb, pH, Cond, Temp | NA | VOCs (24-hour turnaround) | 168 | 20-foot intervals from 40 - 450 feet bgs (21 samples/borehole) |
| **Groundwater Samples** | | | | | | |
| 10 Existing Monitoring Wells ***2 rounds*** | GW | DO, Eh, Turb, pH, Cond, Temp, ferrous iron | LDL VOCs, TCL SVOCs and P/PCBs, TAL metals, cyanide | Nitrate, TOC, chloride, methane/ ethane/ethene, soluble manganese, sulfate, hydrogen sulfide | 20 | 1 per well per round |
| 2 Garden City Supply Wells ***2 rounds*** | GW | DO, Eh, Turb, pH, Cond, Temp, ferrous iron | LDL VOCs, TCL SVOCs and P/PCBs, TAL metals, cyanide | Nitrate, TOC, chloride, methane/ ethane/ethene, soluble manganese, sulfate, hydrogen sulfide | 4 | 1 per well per round |
| Multi-Port Monitoring Wells: 5 wells with 10 ports 3 wells with 6 ports (68 ports) ***2 rounds*** | GW | DO, Eh, Turb, pH, Cond, Temp, ferrous iron | LDL VOCs | NA | 136 | 1 per port per round |
| | | | TCL SVOCs, P/PCBs, TAL metals, cyanide | NA | 14 | 10% of sampling ports per round |
| | | | NA | Nitrate, TOC, chloride, methane/ ethane/ethene, soluble manganese, sulfate, hydrogen sulfide | 14 | 10% of sampling ports per round |
| **Air Samples** | | | | | | |
| Indoor Vapor Samples | Indoor Air | NA | NA | VOCs | 2 | One sample below the basement of 100 and 200 Garden City Plaza |

300226

**Summary of Sampling and Analysis Program**
**Old Roosevelt Field Contaminated Groundwater Area Site**
**Nassau County, New York**

Notes: (1) environmental samples only

Abbreviations: DO = dissolved oxygen; Eh = oxidation-reduction potential; Turb = turbidity; Cond = conductivity; Temp = temperature; NA = not applicable; VOC = volatile organic compound; TCL = Target Compound List; SVOC = semivolatile organic compound; PCB = polychlorinated biphenyl; TAL = Target Analyte List; TOC = total organic carbon

**Table 5-3**
**Proposed RI Report Format**
**Old Roosevelt Field Contaminated Groundwater Area Site**
**Nassau County, New York**

1.0 Introduction
- 1.1 Purpose of Report
- 1.2 Site Background
  - 1.2.1 Site Description
  - 1.2.2 Site History
  - 1.2.3 Previous Investigations
- 1.3 Report Organization

2.0 Study Area Investigation
- 2.1 Surface Features (topographic mapping, etc.) (natural and manmade features)
- 2.2 Contaminant Source Investigations
- 2.3 Meteorological Investigations
- 2.4 Geological Investigations
- 2.5 Groundwater Investigation
- 2.6 Human Population Surveys
- 2.7 Ecological Investigation (Optional, if conducted)

3.0 Physical Characteristics of Site
- 3.1 Topography
- 3.2 Meteorology
- 3.3 Geology
- 3.5 Hydrogeology
- 3.6 Air Quality
- 3.7 Demographics and Land Use

4.0 Nature and Extent of Contamination
- 4.1 Sources of Contamination
- 4.2 Groundwater
- 4.3 Indoor Air Vapors

5.0 Contaminant Fate and Transport
- 5.1 Routes of Migration
- 5.2 Contaminant Persistence
- 5.3 Contaminant Migration

6.0 Baseline Risk Assessment
- 6.1 Human Health Evaluation
  - 6.1.1 Summary of Data Collection and Evaluation
  - 6.1.2 Exposure Assessment
  - 6.1.3 Toxicity Assessment
  - 6.1.4 Risk Characterization
  - 6.1.5 Uncertainty Assessment
- 6.2 Ecological Evaluation (Optional, if conducted)
  - 6.2.1 Screening Level Ecological Risk Assessment
  - 6.2.2 Ecological Risk Assessment

7.0 Summary and Conclusions
- 7.1 Source(s) of Contamination
- 7.2 Nature and Extent of Contamination
- 7.3 Fate and Transport
- 7.4 Risk Assessment
- 7.5 Data Limitations and Recommendations for Future Work
- 7.6 Recommended Remedial Action Objectives

Appendices
Analytical Data/QA/QC Evaluation Results
Boring Logs

## Table 5-4

## Detailed Evaluation Criteria for Remedial Alternatives
## Old Roosevelt Field Contaminated Groundwater Area Site
## Nassau County, New York

- SHORT-TERM EFFECTIVENESS
  - Protection of community during remedial action
  - Protection of workers during remedial actions
  - Time until remedial response objectives are achieved
  - Environmental impacts

- LONG-TERM EFFECTIVENESS
  - Magnitude of risk remaining at the site after the response objectives have been met
  - Adequacy of controls
  - Reliability of controls

- REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT
  - Treatment process and remedy
  - Amount of hazardous material destroyed or treated
  - Reduction in toxicity, mobility or volume of the contaminants
  - Irreversibility of the treatment
  - Type and quantity of treatment residuals

- IMPLEMENTABILITY
  - Ability to construct technology
  - Reliability of technology
  - Ease of undertaking additional remedial action, if necessary
  - Monitoring considerations
  - Coordination with other agencies
  - Availability of treatment, storage capacity, and disposal services
  - Availability of necessary equipment and specialists
  - Availability of prospective technologies

- COST
  - Capital costs
  - Annual operating and maintenance costs
  - Present worth
  - Sensitivity Analysis

---

- COMPLIANCE WITH ARARs
  - Compliance with chemical-specific ARARs
  - Compliance with action-specific ARARs
  - Compliance with location-specific ARARs
  - Compliance with appropriate criteria, advisories and guidance

- OVERALL PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

- STATE ACCEPTANCE

- COMMUNITY ACCEPTANCE

## Table 5-5
## Proposed FS Report Format
## Old Roosevelt Field Contaminated Groundwater Area Site
## Nassau County, New York

1.0 Introduction
- 1.1 Purpose and Organization of Report
- 1.2 Site Description and History
- 1.3 Site
- 1.4 Source(s) of Contamination
- 1.5 Nature and Extent of Contamination
- 1.6 Contaminant Fate and Transport
- 1.7 Baseline Risk Assessment

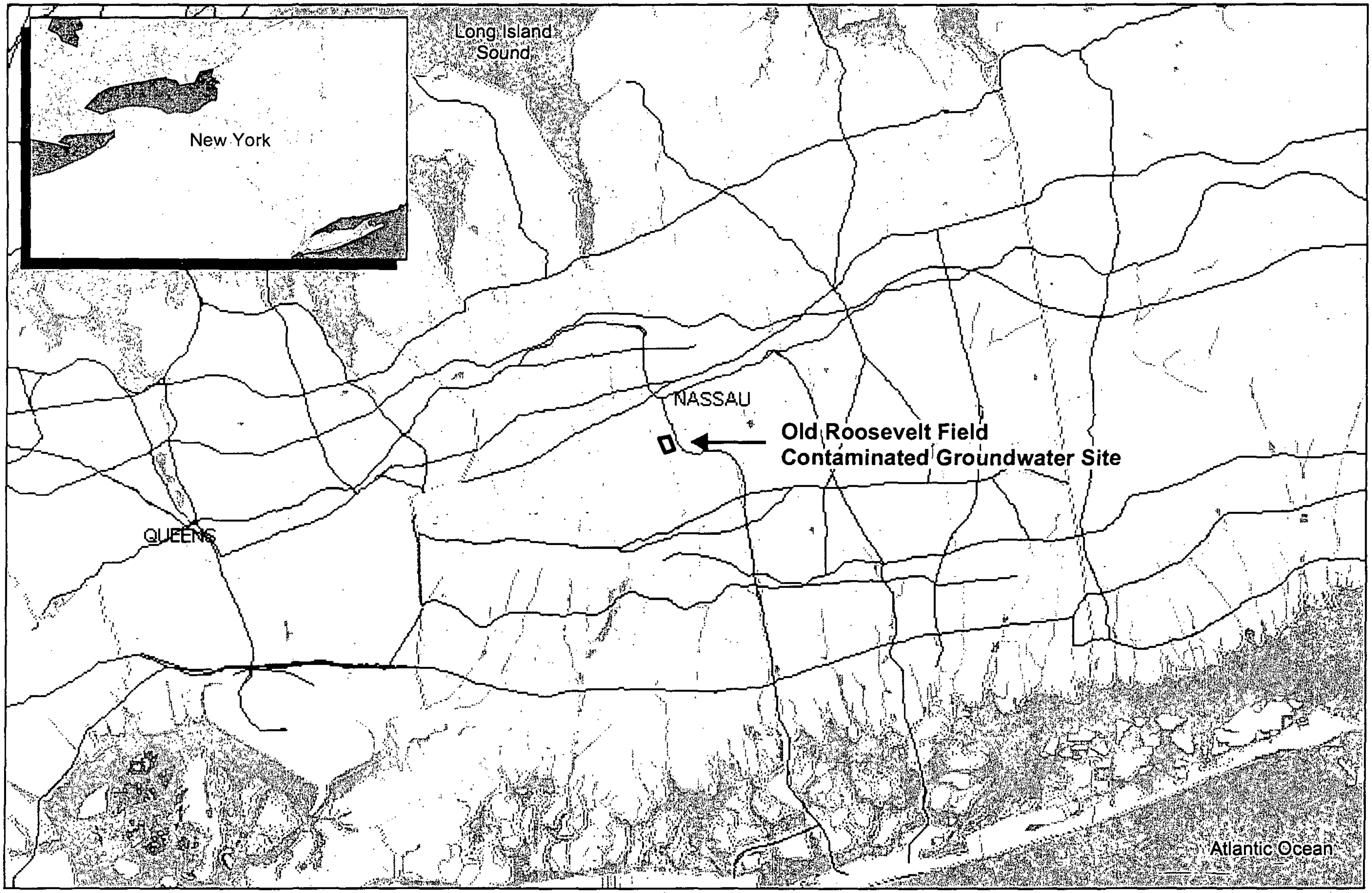
2.0 Identification and Screening of Technologies
- 2.1 Remedial Action Objectives
  - Contaminants of Interest
  - Allowable Exposure Based on Risk Assessment
  - Allowable Exposure Based on ARARs
  - Development of Remedial Action Objectives
- 2.2 General Response Actions
  - Volumes
  - Containment
  - Technologies
- 2.3 Screening of Technology and Process Options
  - 2.3.1 Description of Technologies
  - 2.3.2 Evaluation of Technologies
  - 2.3.3 Screening of Alternatives
  - Effectiveness
  - Implementability
  - Cost

3.0 Development of Alternatives
- 3.1 Development of Alternatives
- 3.2 Screening of Alternatives
  - 3.2.1 Alternative 1
  - 3.2.2 Alternative 2
  - 3.2.3 Alternative 3

4.0 Detailed Analysis of Alternatives
- 4.1 Description of Evaluation Criteria
  - Short-Term Effectiveness
  - Long-Term Effectiveness and Permanence
  - Implementability
  - Reduction of Mobility, Toxicity, or Volume Through Treatment
  - Compliance with ARARs
  - Overall Protection
  - Cost
  - State Acceptance
  - Community Acceptance
- 4.2 Individual Analysis of Alternatives
  - 4.2.1 Alternative 1
  - 4.2.2 Alternative 2
  - 4.2.3 Alternative 3
- 4.3 Summary

5.0 Comparative Analysis of Alternatives
- 5.1 Comparison Among Alternatives

Figures

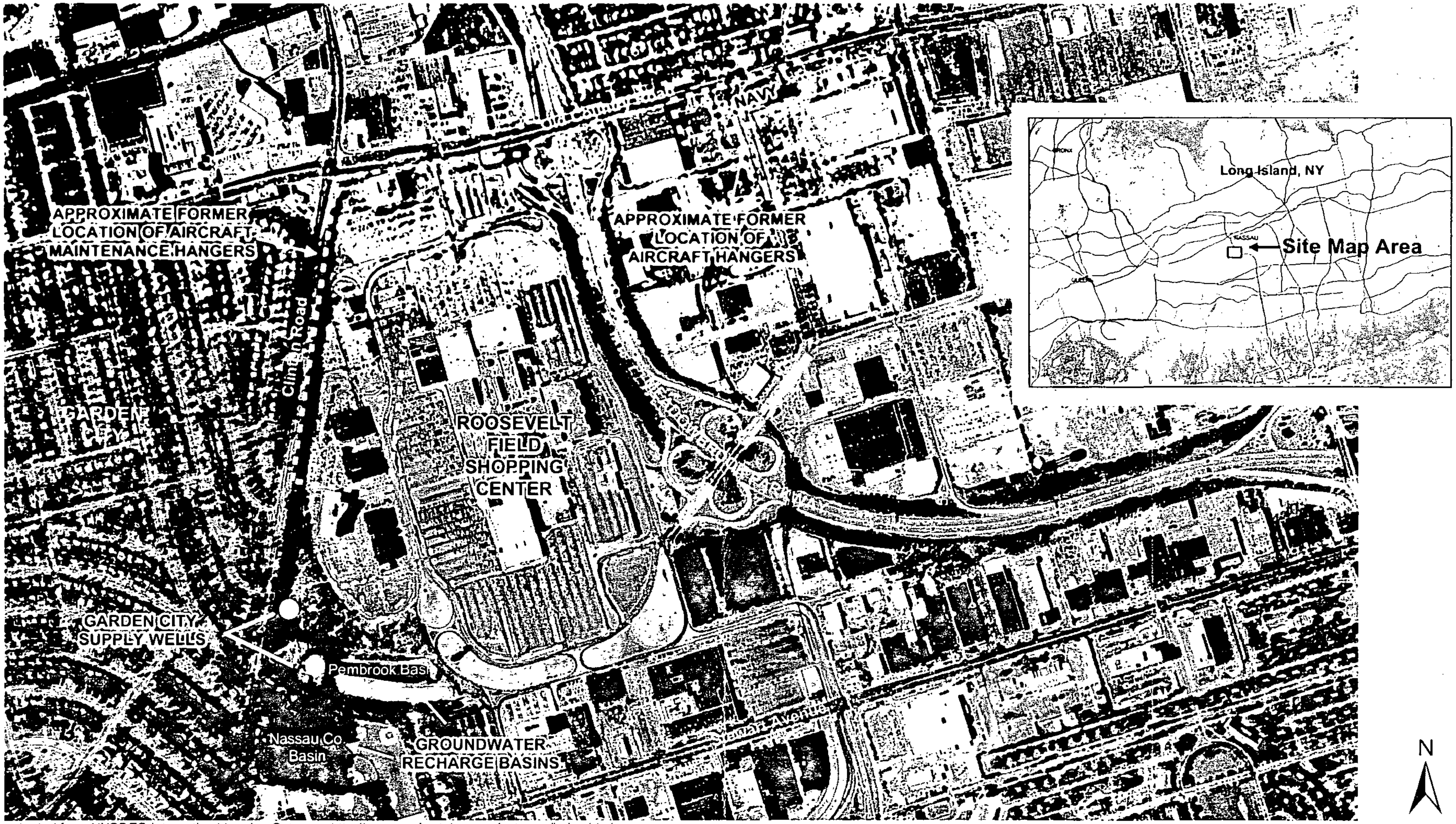



adapted from NYSDEC Interactive Mapping Gateway: http://www.nygis.state.ny.us/gateway/index.html

CDM

**Figure 2-1**
**Site Location Map**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York

300232

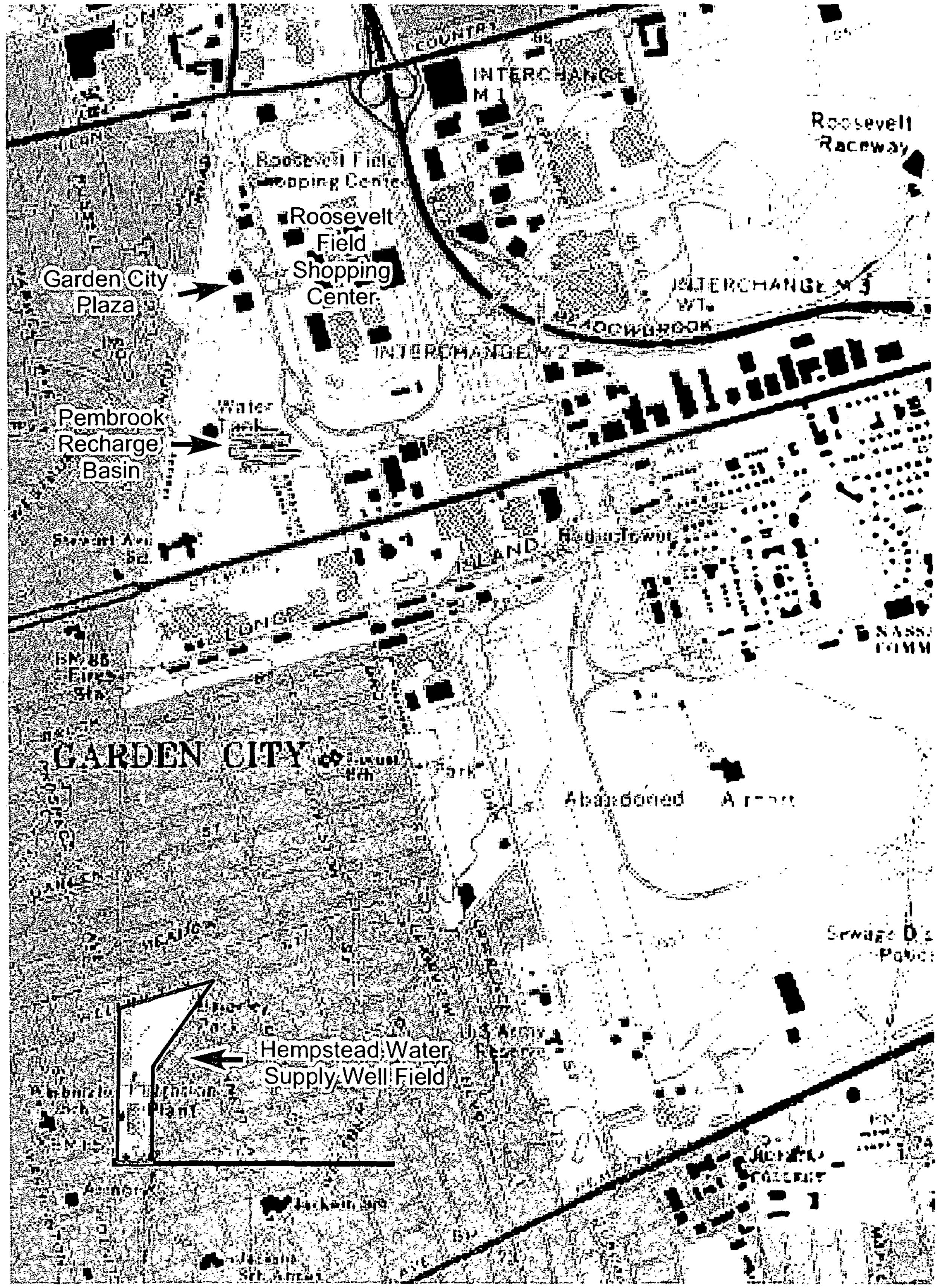



*adapted from NYSDEC Interactive Mapping Gateway: http://www.nygis.state.ny.us/gateway/index.html*

CDM

0.25 0.125 0 0.25 Miles

**Figure 2-2**
**Site Map**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County New York



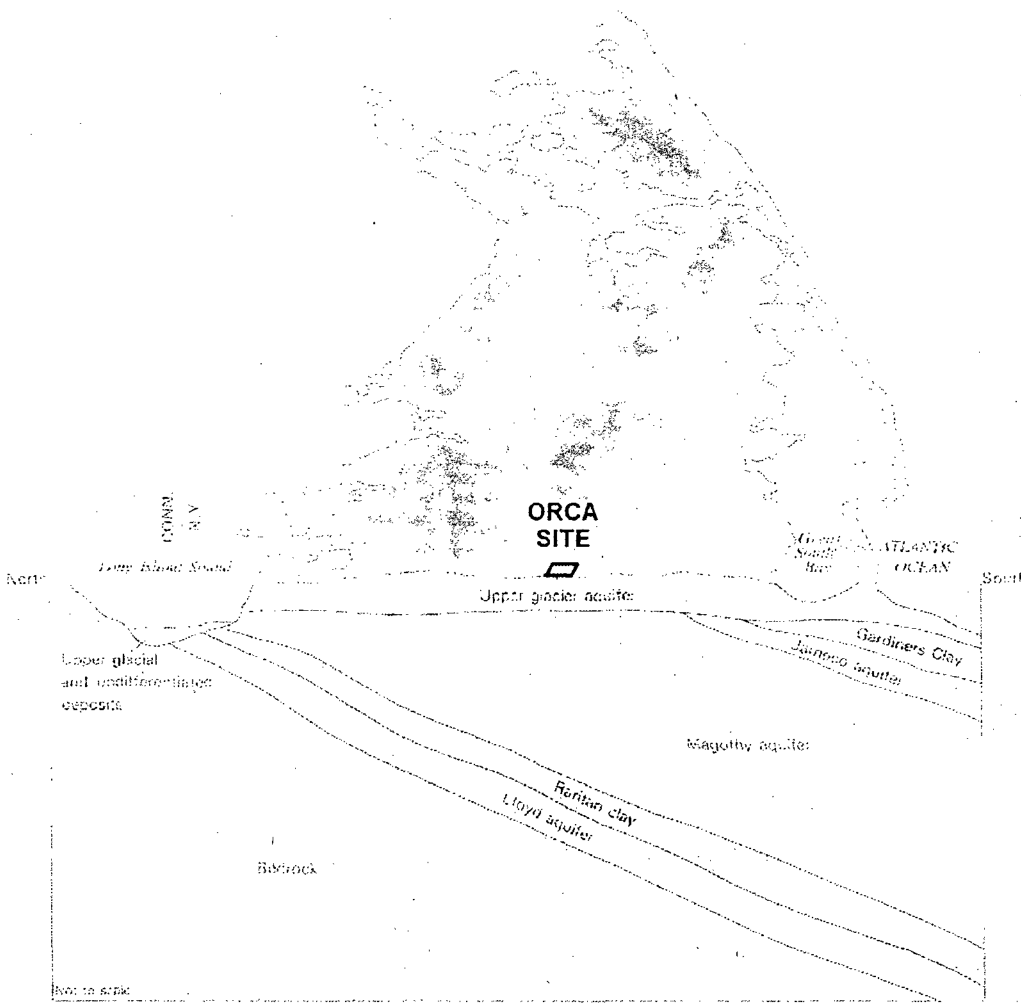

*adapted from the USGS Freeport 1:24,000 Topographic Quadrangle (1979)*

*Contour interval = 5 feet above mean sea level*

CDM

**Figure 3-2**
**Site Topographic Map**

Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York




*Modified from Franke and McClymonds (1972)*

CDM Federal Programs Corporation

*A Subsidiary of Camp Dresser & McKee*

Figure 3-3
Generalized Geologic Section of
Long Island Aquifer System in Nassau County

Remedial Investigation/Feasibility Study
Old Roosevelt Field Contaminated Groundwater Area Site
Nassau County, New York

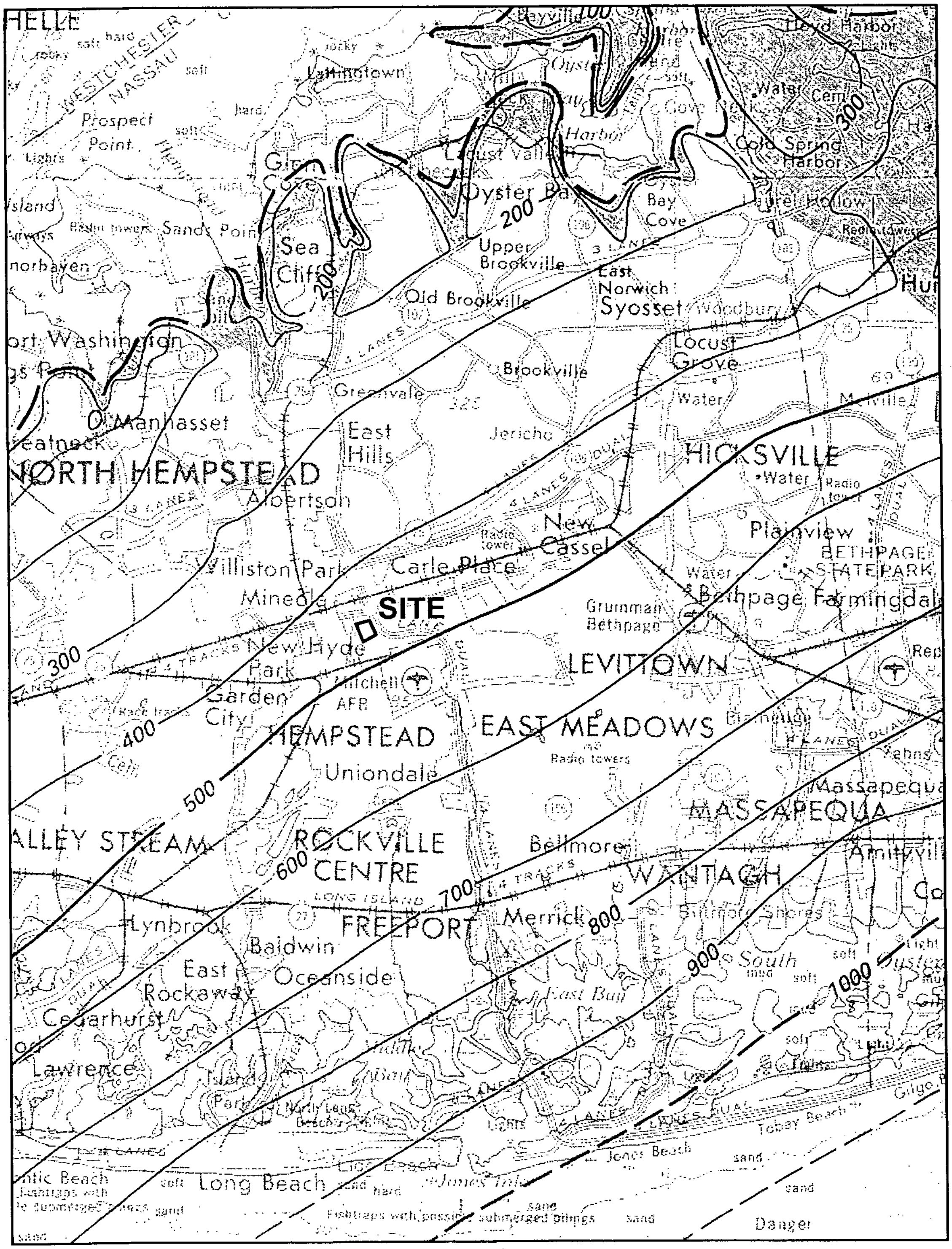
| System | Series | Age | Stratigraphic Unit | Hydrostratigraphic Unit |
|---|---|---|---|---|
| QUATERNARY | Holocene | Postglacial | Holocene (recent) deposits | Upper glacial aquifer |
| | Pleistocene | Wisconsin (upper Pleistocene) | Upper Pleistocene deposits | |
| | | | "20-foot" clay | "20-foot" clay |
| | | | Upper Pleistocene deposits | Upper glacial aquifer |
| | | | unconformity | |
| | | Sangamon | Gardiners Clay | Gardiners Clay |
| | | | unconformity | |
| | | Pre-Sangamon | Jameco Gravel[1] | Jameco aquifer[1] |
| | | Pre-Sangamon | Reworked Matawan-Magothy channel deposits | Upper glacial or Magothy aquifer |
| unconformity | | | | |
| CRETACEOUS | Upper Cretaceous | | Monmouth Group | Monmouth greensand |
| | | | unconformity | |
| | | | Matawan Group-Magothy Formation, undifferentiated | Magothy aquifer |
| | | | unconformity | |
| | | | Raritan Formation: Unnamed clay member | Raritan confining unit |
| | | | Raritan Formation: Lloyd Sand Member | Lloyd aquifer |
| unconformity | | | | |
| Paleozoic (or) Precambrian | | | Bedrock | Relatively impermeable bedrock |

[1] Present in Nassau County Only

*adapted from Krulikas (1987)*

CDM

**Figure 3-4**
**General Regional Stratigraphy**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York




EXPLANATION

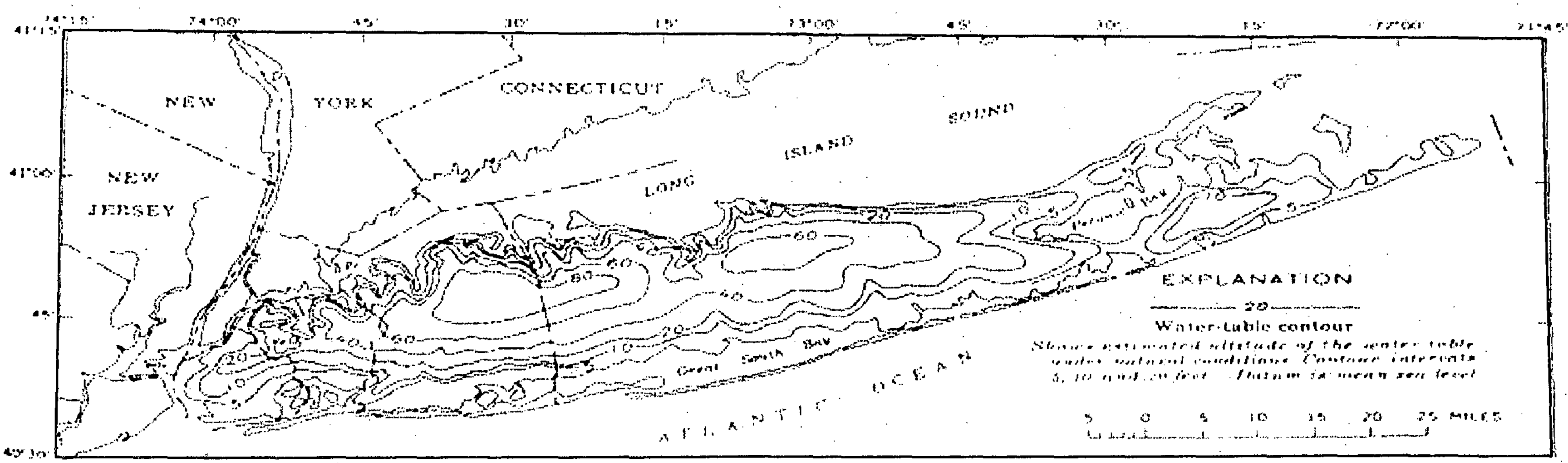
SHADING INDICATES LOCATION OF SUBCROP OF THE RARITAN CONFINING UNIT

UPDIP LIMIT OF THE RARITAN CONFINING UNIT

0 STRUCTURE CONTOUR—Shows the upper surface of the Raritan confining unit. Dashed where approximately located. Contour interval 100 feet. National Geodetic Vertical Datum of 1929

CDM

**Figure 3-5**
**Subcrop Map of Top-Raritan Clay Member**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York




*after Franke and McClymonds (1972)*

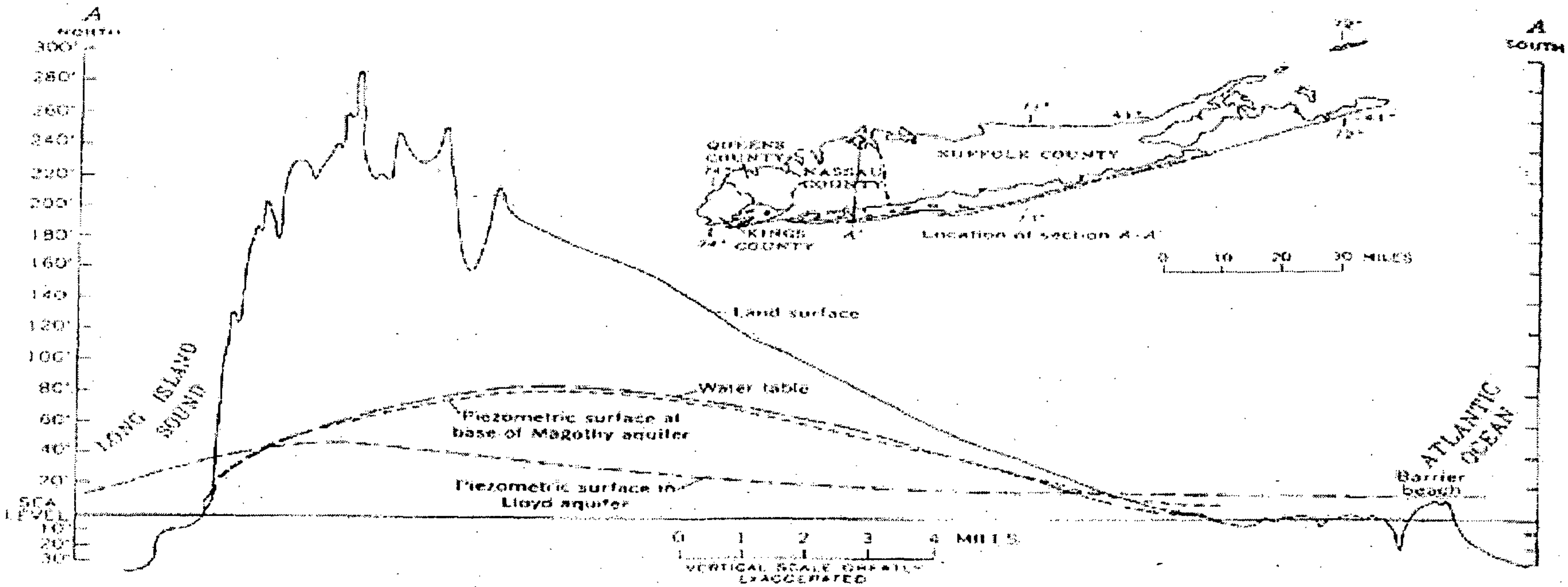
300238

CDM

**Figure 3-6**

**Estimated Average Position of Water Table Under Natural Conditions**

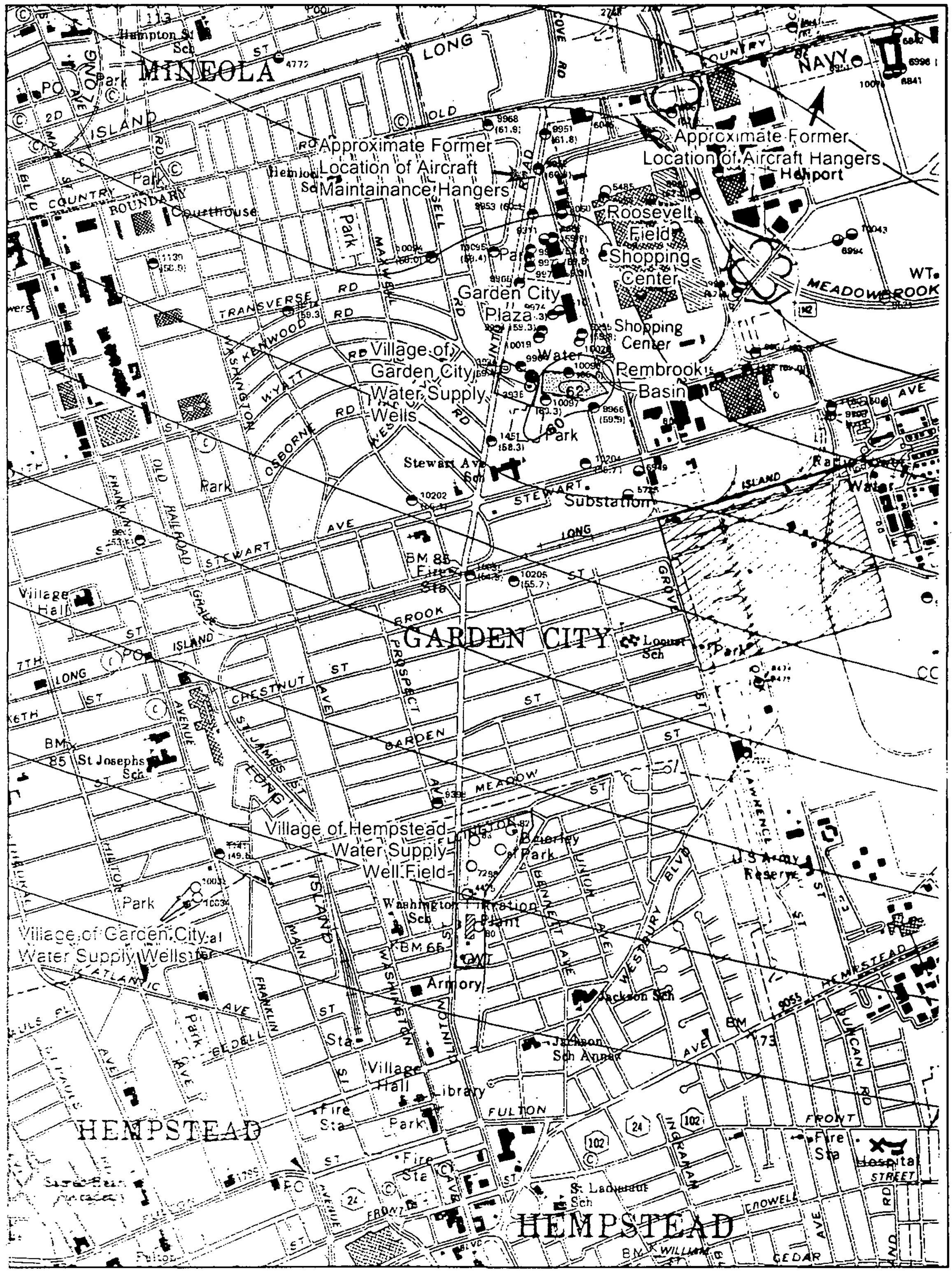
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York




after Franke and McClymonds (1972)

**Figure 3-7**
**Profiles of the Water Table and Piezometric Surfaces at the Base of the Magothy and in the Lloyd Aquifers**

Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York




*adapted from Eckhardt and Pearsall (1989)*

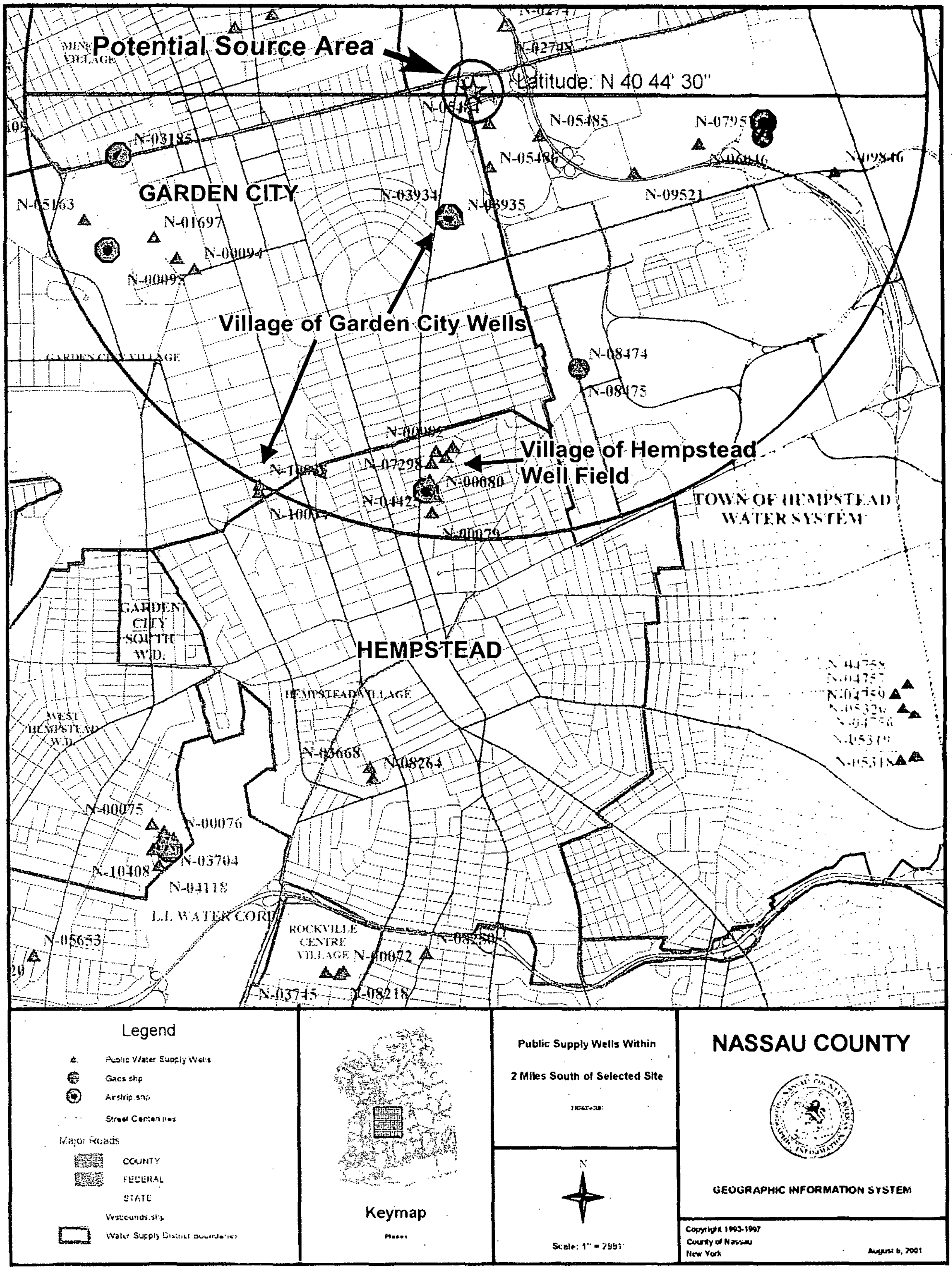
- OBSERVATION WELL AND LOCAL NUMBER--Number in parentheses is water-table altitude on April 25, 1984, in feet. Datum is mean sea level
- PUBLIC WATER-SUPPLY WELL AND LOCAL NUMBER
- COOLING-WATER WELL AND LOCAL NUMBER
- 54 —— LINE OF EQUAL WATER-TABLE ALTITUDE IN UPPER GLACIAL AQUIFER--Dashed where approximately located. Contour interval 2 feet. Datum is mean sea level
- PART OF MITCHEL FIELD AREA EXCLUDED FROM THIS STUDY

N

300240

**Figure 3-8**
**Water Table Contours for April 1984 and Location of Former and Existing Wells in the Old Roosevelt Field Contaminated Gorundwater Area**

CDM




provided by the Nassau County Department of Health

**Figure 3-9**
**Public Supply Wells South of the Site**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York

CDM


(a) TCE concentrations in the Upper Glacial Aquifer (Summer 1983)

(b) TCE concentrations in the Upper Glacial Aquifer (Spring 1984)

(c) TCE concentrations in the Magothy Aquifer (Spring 1984)

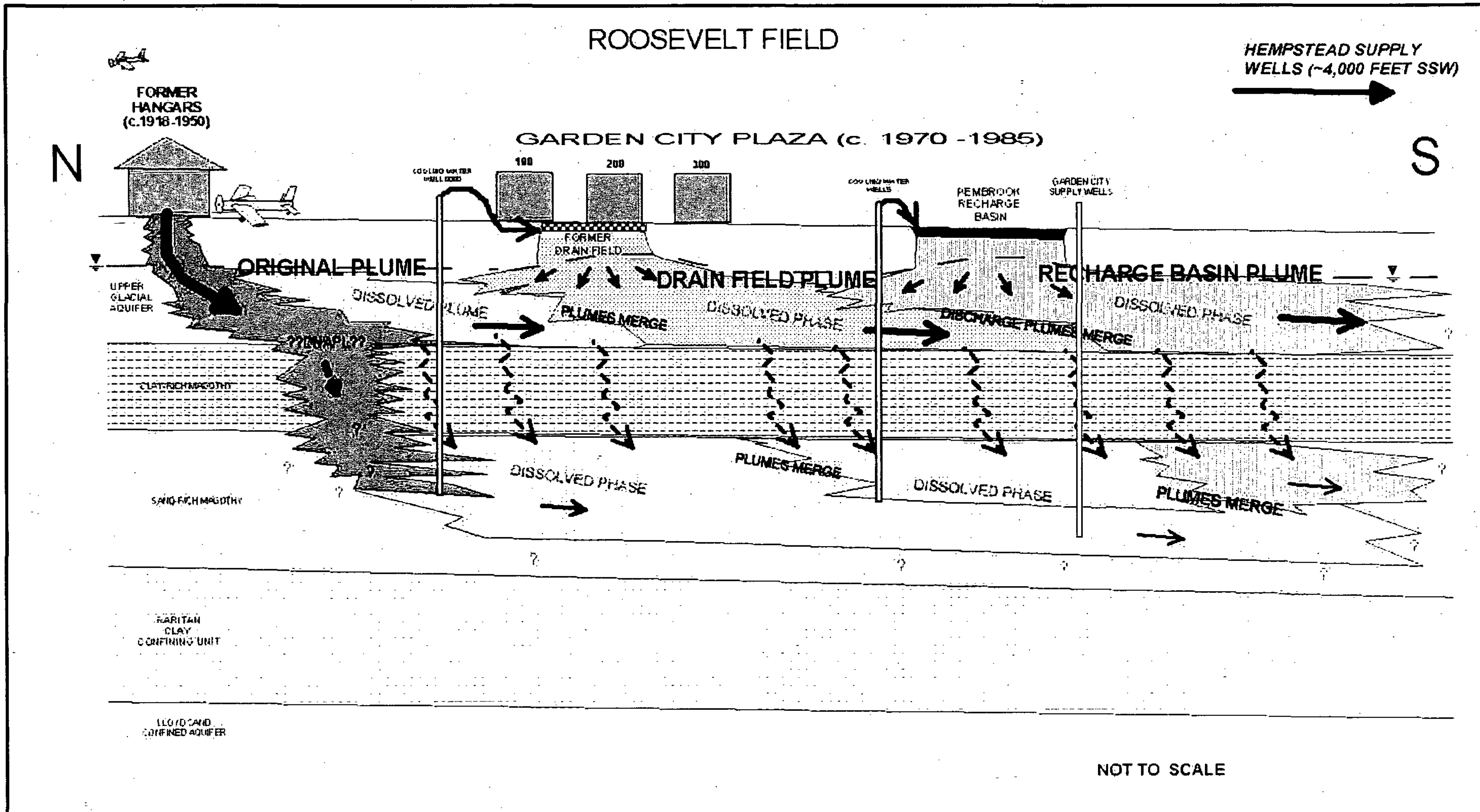
*from Eckhardt and Pearsall (1989)*

**Figure 3-10**

**Trichloroethylene Concentrations in: (a) The Upper Glacial Aquifer in 1983, During Heavy Cooling water Pumping; (b) in the Upper Glacial Aquifer in 1984, Before the Start of Seasonal Cooling Water Pumping; and (c) in the Magothy Aquifer in 1984 Before the Start of Seasonal Cooling Water Pumping**

CDM

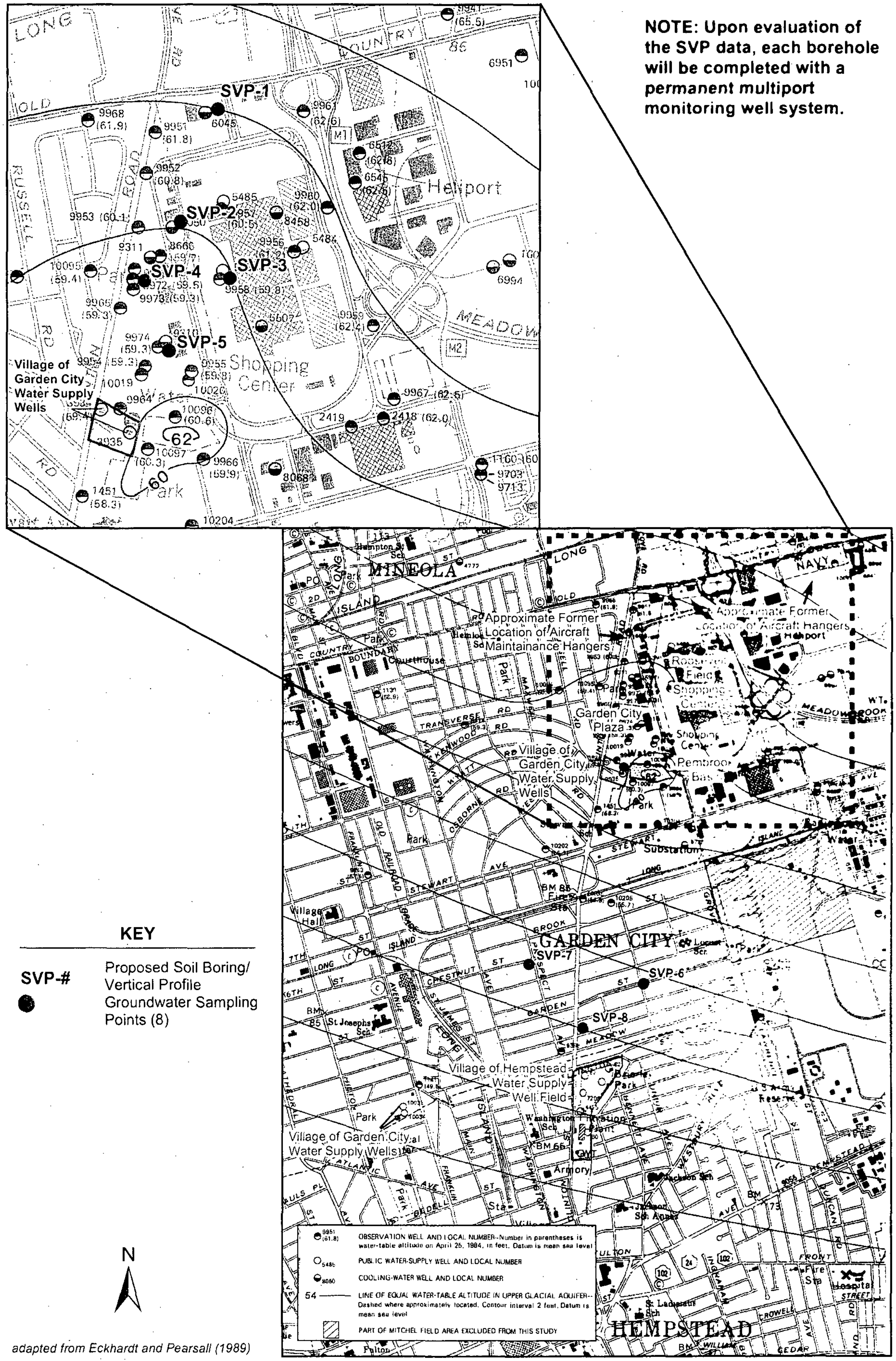
Old Roosevelt Field Contaminated Groundwater Site
Nassau County New York




**CDM**
*A Subsidiary of Camp Dresser & McKee*

Figure 3-11
Conceptual Contaminant Model

Remedial Investigation/Feasibility Study
Old Roosevelt Field Contaminated Groundwater Area Site
Nassau County, New York

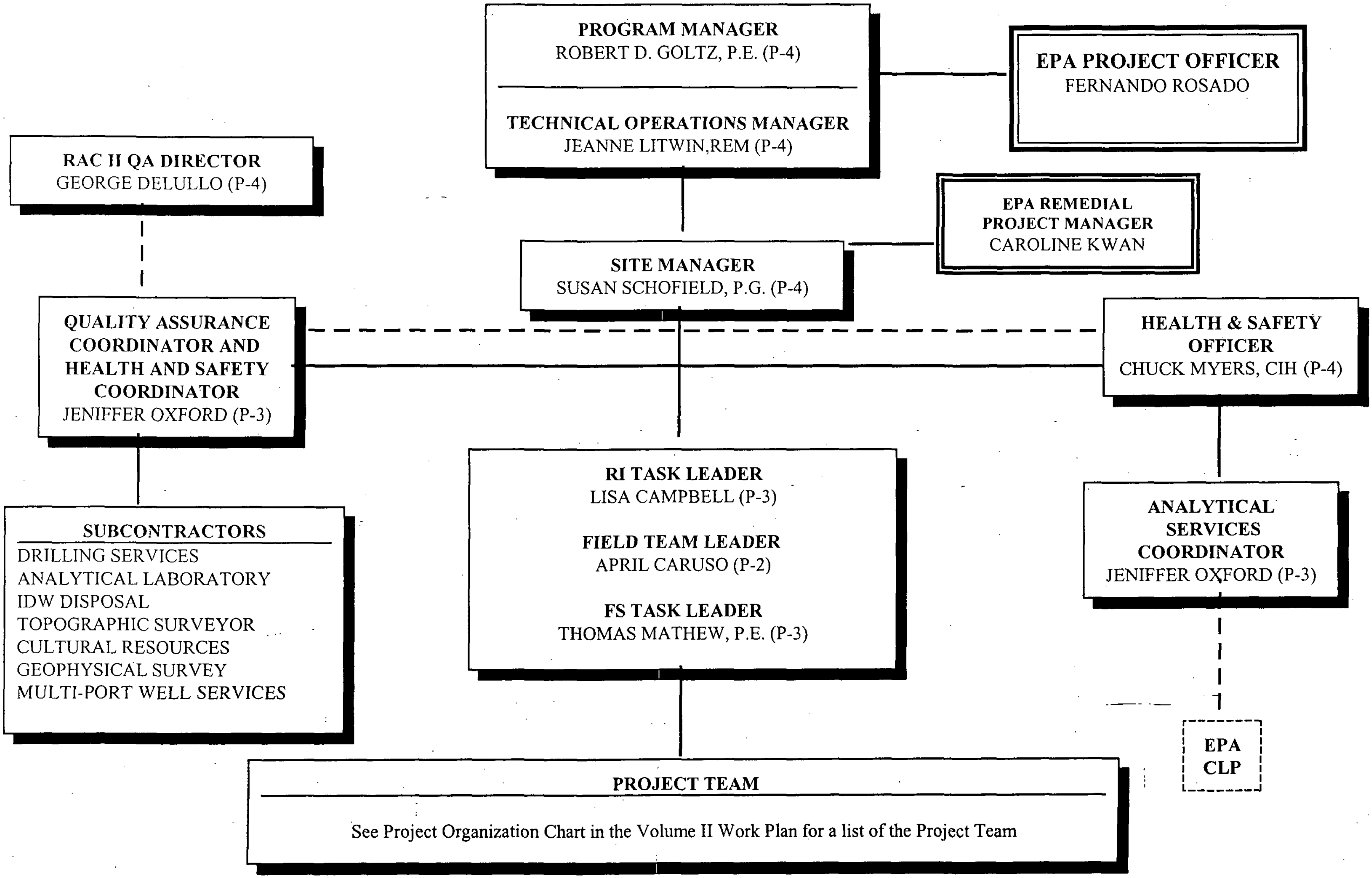



CDM

**Figure 5-1**
**Soil Boring/Vertical Profile Groundwater Sampling Point Locations**
Old Roosevelt Field Contaminated Groundwater Site
Nassau County, New York

Figure 7-1

**Project Organization**
**Old Roosevelt Field Contaminated Groundwater Area Site**
**Nassau County, New York**




300245

# Appendix A

# Appendix A

## Existing Well Inventory and Previous Groundwater Sampling Data

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MONITORING WELLS | | | | | | | | | | | |
| N-1141 | UG | 40-43 | 1 | | Nassau Co. | | | | | | |
| N-1160 | UG | 53-58 | 4 | | Nassau Co. | 06/02/1980 | | 7 | 2 | 13 | NCDH |
| | | | | | | 10/01/1980 | <30 | 6 | 1 | 9 | NCDH |
| | | | | | | 02/25/1982 | <25 | 3 | | 26 | NCDH |
| | | | | | | 07/26/1982 | <7 | 1 | 24 | 27 | NCDH |
| | | | | | | 12/01/1982 | 1 | 1 | 35 | 39 | NCDH |
| | | | | | | 03/25/1983 | <4 | 3 | 7 | 43 | NCDH |
| | | | | | | " | <1 | 4 | 15 | 70 | NWQL |
| | | | | | | 04/01/1984 | <4 | <3 | 3 | 56 | NCDH |
| | | | | | | " | <3 | <3 | 3 | 92 | NWQL |
| N-1451 | UG | 32-35 | 1 | | Nassau Co. | 05/03/1984 | <4 | <3 | <1 | bdl | NCDH |
| N-2418 | UG | 40-55 | 10 | | Unknown | | | | | | |
| N-2419 | UG | 37-58 | 12 | | Unnkown | | | | | | |
| N-6512 | UG | 61-71 | 6 | | Island Heliport | | | | | | |
| N-6545 | UG | 30-40 | 6 | | Island Heliport | | | | | | |
| N-6949 | UG | 41-46 | 6 | | Newsday | 07/07/1982 | <7 | 18 | 2 | 25 | NCDH |
| | | | | | | 08/03/1983 | 11 | 51 | 7 | 7 | NCDH |
| | | | | | | 05/11/1984 | <5 | 12 | 3 | 38 | NCDH |
| N-6951 | M | 304-334 | 12 | | Avis | | | | | | |
| N-8666 | UG | 43-67 | 8 | | VMI | 03/14/1981 | <5 | 120 | 1 | 120 | NCDH |
| | | | | | | 08/08/1983 | 92 | 450 | 2 | 550 | NCDH |
| | | | | | | " | 140 | 580 | 7 | 740 | NWQL |
| | | | | | | 04/24/1984 | 84 | 540 | 2 | 630 | NCDH |
| N-9398 | UG | 21-22 | 1 | | Nassau Co. | 09/19/1984 | | <1 | <1 | bdl | NCDH |
| N-9703 | M | 96-106 | 4 | | Nassau Co. | 05/14/1984 | 260 | 18 | 36 | 520 | NCDH |
| N-9713 | M | 205-215 | 4 | | Nassau Co. | 05/14/1984 | <5 | <1 | <1 | bdl | NCDH |
| N-9914 | UG | 49-54 | 4 | | Nassau Co. | 11/16/1982 | <1 | 1 | <1 | 1 | NCDH |
| | | | | | | 08/29/1983 | <4 | 2 | 2 | 16 | NCDH |
| | | | | | | 04/06/1984 | <4 | <3 | 2 | 8 | NCDH |
| N-9938 | UG | 72-77 | 4 | | Nassau Co. | | | | | | |

300248

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-9941 | UG | 42-47 | 4 | | Nassau Co. | 08/29/1983 | <4 | 2 | 2 | 16 | NCDH |
| | | | | | | 04/06/1984 | <4 | <3 | 2 | 8 | NCDH |
| N-9943 | UG | 61-66 | 4 | | Nassau Co. | 07/28/1986 | bdl | 2 | 0 | 2 | NCDPW |
| N-9951 | UG | 38-54 | 4 | | Nassau Co. | 07/01/1982 | <7 | 4 | 2 | 19 | NCDH |
| | | | | | | 11/16/1982 | <1 | 1 | <1 | 24 | NCDH |
| | | | | | | 08/02/1983 | <4 | 4 | 1 | 1,000 | NCDH |
| | | | | | | " | <1 | <1 | <1 | bdl | NWQL |
| | | | | | | 10/18/1983 | <4 | 4 | 2 | | NCDH |
| | | | | | | " | <3 | 7 | 4 | 1,200 | NWQL |
| | | | | | | 04/30/1984 | <4 | <3 | <1 | 5 | NCDH |
| | | | | | | " | <3 | <3 | <3 | bdl | NWQL |
| N-9952 | UG | 48-54 | 4 | | Nassau Co. | 06/30/1982 | <7 | 14 | 1 | 35 | NCDH |
| | | | | | | 11/11/1982 | <1 | 5 | <1 | 6 | NCDH |
| | | | | | | 08/04/1983 | <4 | 8 | <1 | 9 | NCDH |
| | | | | | | 10/20/1983 | <4 | 6 | <1 | | NCDH |
| | | | | | | " | <3 | 10 | <3 | 10 | NWQL |
| | | | | | | 04/23/1984 | <4 | <3 | <1 | bdl | NCDH |
| | | | | | | " | <3 | 4 | <3 | 4 | NWQL |
| N-9953 | UG | 48-54 | 4 | | Nassau Co. | 06/28/1982 | <7 | <1 | <1 | 1 | NCDH |
| | | | | | | 11/16/1982 | 24 | 210 | 2 | 240 | NCDH |
| | | | | | | 08/04/1983 | 84 | 480 | 3 | 570 | NCDH |
| | | | | | | 04/30/1984 | <4 | 56 | 3 | 64 | NCDH |
| | | | | | | " | 5 | 200 | <3 | 210 | NWQL |
| N-9954 | UG | 48-54 | 4 | | Nassau Co. | 06/17/1982 | 30 | 220 | 21 | 280 | NCDH |
| | | | | | | 11/15/1982 | 8 | 110 | 36 | 160 | NCDH |
| | | | | | | 08/02/1983 | 61 | 480 | 50 | 600 | NCDH |
| | | | | | | " | <1 | 9 | 3 | 240 | NWQL |
| | | | | | | 12/01/1983 | 10 | 84 | 34 | 130 | NWQL |
| | | | | | | 04/17/1984 | <4 | 92 | 31 | 130 | NCDH |
| | | | | | | " | 4 | 69 | 28 | 100 | NWQL |
| | | | | | | 07/19/1984 | 39 | 310 | 56 | 410 | NWQL |

300249

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-9955 | UG | 48-54 | 4 | | Nassau Co. | 06/18/1982 | <7 | 36 | 21 | 58 | NCDH |
| | | | | | | 11/17/1982 | 79 | 510 | 71 | 670 | NCDH |
| | | | | | | 08/04/1983 | 5 | 5 | 2 | 12 | NCDH |
| | | | | | | 04/24/1984 | 24 | 440 | 77 | 560 | NCDH |
| N-9956 | UG | 48-54 | 4 | | Nassau Co. | 06/30/1982 | <7 | 17 | <1 | 18 | NCDH |
| | | | | | | 11/17/1982 | <1 | 5 | <1 | 6 | NCDH |
| | | | | | | 08/05/1983 | <4 | 5 | <1 | 6 | NCDH |
| | | | | | | 04/16/1984 | <4 | 8 | <1 | 8 | NCDH |
| N-9957 | UG | 48-54 | 4 | | Nassau Co. | 06/30/1982 | <7 | <1 | 1 | 1 | NCDH |
| | | | | | | 11/17/1982 | <1 | 2 | <1 | 2 | NCDH |
| | | | | | | 08/05/1983 | <4 | 1 | <1 | 2 | NCDH |
| | | | | | | 04/16/1984 | <4 | <3 | <1 | bdl | NCDH |
| N-9958 | UG | 48-54 | 4 | | Nassau Co. | 06/30/1982 | <7 | 1 | 1 | 3 | NCDH |
| | | | | | | 11/17/1982 | 5 | 11 | <1 | 18 | NCDH |
| | | | | | | 08/05/1983 | <4 | 1 | <1 | 1 | NCDH |
| | | | | | | 04/12/1984 | <4 | <3 | <1 | bdl | NCDH |
| N-9959 | UG | 48-54 | 4 | | Nassau Co. | 06/29/1982 | <7 | <1 | 1 | 3 | NCDH |
| | | | | | | 11/15/1982 | <1 | 1 | <1 | 2 | NCDH |
| | | | | | | 08/11/1983 | <4 | <1 | <4 | bdl | NCDH |
| | | | | | | 04/06/1984 | <4 | 3 | <1 | bdl | NCDH |
| N-9960 | UG | 48-54 | 4 | | Nassau Co. | 06/28/1982 | 7 | 33 | 1 | 42 | NCDH |
| | | | | | | 11/15/1982 | 1 | 27 | 1 | 29 | NCDH |
| | | | | | | 08/11/1983 | <4 | 10 | <4 | 10 | NCDH |
| | | | | | | 04/09/1984 | <4 | 5 | 1 | 28 | NCDH |
| N-9961 | UG | 48-54 | 4 | | Nassau Co. | 06/29/1982 | <7 | 1 | 1 | 3 | NCDH |
| | | | | | | 11/15/1982 | <1 | <1 | 1 | 2 | NCDH |
| | | | | | | 08/11/1983 | <4 | <1 | <4 | bdl | NCDH |
| | | | | | | 04/09/1984 | <4 | <3 | 1 | 2 | NCDH |
| N-9964 | UG | 48-54 | 4 | | Nassau Co. | 06/18/1982 | <7 | 30 | 11 | 42 | NCDH |
| | | | | | | 06/24/1982 | 16 | 120 | 24 | 160 | NCDH |
| | | | | | | 11/17/1982 | 45 | 360 | 68 | 480 | NCDH |

300250

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 08/08/1983 | 62 | 290 | 50 | 410 | NCDH |
| | | | | | | " | 83 | 360 | 67 | 520 | NCDH |
| | | | | | | 04/19/1984 | <4 | 20 | 7 | 27 | NCDH |
| | | | | | | " | <3 | 16 | 8 | 24 | NWQL |
| N-9965 | UG | 48-54 | 4 | | Nassau Co. | 07/08/1982 | <7 | 3 | <1 | 3 | NCDH |
| | | | | | | 06/30/1982 | <7 | 3 | 1 | 5 | NCDH |
| | | | | | | 08/04/1983 | 120 | 670 | 4 | 800 | NCDH |
| | | | | | | 10/18/1983 | 83 | 370 | 2 | 455 | NCDH |
| | | | | | | " | 170 | 530 | 5 | 710 | NWQL |
| | | | | | | 04/23/1984 | 70 | 320 | 1 | 390 | NCDH |
| | | | | | | " | <3 | 270 | <3 | 270 | NWQL |
| N-9967 | UG | 48-54 | 4 | | Nassau Co. | 06/28/1982 | <7 | <1 | 1 | 2 | NCDH |
| | | | | | | 11/15/1982 | <1 | <1 | <1 | 1 | NCDH |
| | | | | | | 08/11/1983 | <4 | 1 | 2 | 3 | NCDH |
| | | | | | | 04/09/1984 | <4 | <3 | <1 | bdl | NCDH |
| N-9968 | UG | 48-54 | 4 | | Nassau Co. | 11/16/1982 | <1 | 1 | 9 | 20 | NCDH |
| | | | | | | 12/06/1982 | <1 | <1 | 4 | 5 | NCDH |
| | | | | | | 08/15/1983 | <4 | 5 | 3 | 11 | NCDH |
| | | | | | | 04/06/1984 | <4 | <3 | 2 | 4 | NCDH |
| N-9971 | UG | 35-40 | 1 | | VMI | 08/13/1981 | <5 | 10 | <1 | 87 | NCDH |
| | | | | | | 05/08/1984 | <5 | 29 | 1 | 32 | NCDH |
| | | | | | | 08/08/1984 | 130 | 560 | 3 | 700 | NCDH |
| N-9972 | UG | 35-40 | 1 | | VMI | 08/13/1981 | <5 | 15 | <1 | 64 | NCDH |
| | | | | | | 05/08/1984 | 82 | 440 | 2 | 530 | NCDH |
| | | | | | | 08/08/1984 | 100 | 360 | <4 | 460 | NCDH |
| N-9973 | UG | 35-40 | 1 | | VMI | 08/13/1981 | <5 | <1 | <1 | bdl | NCDH |
| | | | | | | 05/08/1984 | 140 | 750 | 2 | 890 | NCDH |
| | | | | | | 08/08/1984 | 130 | 550 | 5 | 690 | NCDH |
| N-9974 | UG | 30-35 | 1 | | VMI | 08/13/1981 | <5 | 50 | 2 | 70 | NCDH |
| | | | | | | 05/07/1984 | <5 | 2 | <1 | 2 | NCDH |
| | | | | | | 08/08/1984 | <4 | 1 | <4 | 1 | NCDH |

300251

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-10019 | M | 223-228 | 4 | | Nassau Co. | 11/15/1982 | 1 | 19 | 9 | 32 | NCDH |
| | | | | | | 08/16/1983 | <4 | 19 | 8 | 30 | NCDH |
| | | | | | | 05/14/1984 | <5 | 29 | 12 | 50 | NCDH |
| | | | | | | " | 7 | 23 | 12 | 42 | NCDH |
| | | | | | | 05/22/1987 | 2 | 11 | 4 | 18 | NCDH |
| | | | | | | 10/21/1996 | bdl | 301 | 10 | 392 | NCDPW |
| N-10020 | M | 185-190 | 4 | | Nassau Co. | 08/30/1983 | 24 | 170 | 24 | 220 | NCDH |
| | | | | | | 05/09/1984 | 9 | 150 | 20 | 190 | NCDH |
| | | | | | | 05/26/1987 | 309 | 523 | 174 | 1,023 | NCDPW |
| | | | | | | 08/20/1996 | bdl | 7 | 13 | 22 | NCDPW |
| N-10035 | UG | 48-53 | 4 | | Nassau Co. | 05/20/1987 | 7 | 109 | 71 | 187 | NCDPW |
| N-10094 | UG | 60-65 | 4 | | Nassau Co. | 09/30/1983 | <4 | <1 | <1 | bdl | NCDH |
| | | | | | | 04/30/1984 | <4 | <3 | <1 | bdl | NCDH |
| N-10095 | UG | 48-51 | 2 | | USGS | 09/30/1983 | <4 | 1 | 5 | 7 | NCDH |
| | | | | | | 10/19/1983 | <4 | 2 | 4 | 6 | NCDH |
| | | | | | | 04/16/1984 | 34 | 280 | 2 | 320 | NCDH |
| N-10096 | UG | 35-36 | 2 | | USGS | 08/25/1983 | 80 | 300 | 44 | 430 | NCDH |
| | | | | | | " | 140 | 400 | 550 | | NWQL |
| | | | | | | 10/20/1983 | 32 | 220 | 36 | 1,100 | NCDH |
| | | | | | | 05/01/1984 | <4 | 19 | 1 | 21 | NCDH |
| | | | | | | " | <3 | 16 | <3 | 16 | NWQL |
| | | | | | | 07/26/1984 | 130 | 300 | 74 | 520 | NCDH |
| | | | | | | 08/07/1984 | 40 | 370 | 110 | 540 | NCDH |
| N-10097 | UG | 35-36 | 2 | | USGS | 08/17/1983 | 45 | 250 | 39 | 340 | NCDH |
| | | | | | | 11/15/1983 | 38 | 260 | 45 | 340 | NCDH |
| | | | | | | 05/07/1984 | <5 | 2 | <1 | 2 | NCDH |
| | | | | | | 07/02/1984 | 16 | 170 | 44 | 230 | NCDH |
| | | | | | | 08/07/1984 | 17 | 300 | 80 | 450 | NCDH |
| | | | | | | 09/19/1984 | 25 | 270 | 100 | 400 | NCDH |
| N-10202 | UG | 42-45 | 2 | | USGS | 05/07/1984 | <5 | 4 | <1 | 4 | NCDH |
| N-10204 | UG | 41-44 | 2 | | USGS | 04/13/1984 | 10 | 210 | 30 | 260 | NCDH |



300252

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-10205 | UG | 41-44 | 2 | | USGS | 04/13/1984 | 12 | 81 | 65 | 160 | NCDH |
| | | | | | | 05/09/1984 | 41 | 72 | 59 | 170 | NWQL |
| | | | | | | 06/07/1984 | 63 | 94 | 100 | 260 | NWQL |
| | | | | | | 07/21/1984 | 15 | 48 | 33 | 96 | NWQL |
| N-10299 | UG | 51-44 | 2 | | USGS | | | | | | |

300253

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COOLING WELLS | | | | | | | | | | | |
| N-5507 | M | 107-330 | 16 | Abandoned | Macy's | 10/10/1979 | | 240 | 160 | 460 | NCDH |
| | | | | | | 07/28/1980 | | 300 | 190 | 590 | NCDH |
| | | | | | | 06/23/1981 | <25 | 250 | 210 | 490 | NCDH |
| | | | | | | 05/18/1922 | <25 | 360 | 240 | 630 | NCDH |
| | | | | | | 06/23/1983 | 4 | 50 | 6 | 58 | NCDH |
| | | | | | | 08/03/1983 | 10 | 260 | 170 | 470 | NCDH |
| | | | | | | " | 6 | 240 | 160 | 430 | NWQL |
| | | | | | | 04/18/1984 | <4 | 440 | 140 | 600 | NCDH |
| | | | | | | " | 6 | 330 | 140 | 510 | NWQL |
| | | | | | | 08/07/1984 | <4 | 380 | 350 | 840 | NCDH |
| N-5725 | UG | 46-56 | 10 | | Newsday | 07/07/1982 | <7 | 32 | 5 | 38 | NCDH |
| | | | | | | 08/03/1983 | 7 | 49 | 7 | 65 | NCDH |
| | | | | | | 05/11/1984 | 3 | 140 | 14 | 170 | NCDH |
| N-6045 | M | 277-328 | 16 | | Town of Hempstead | 10/23/1979 | | 4 | 2 | 6 | NCDH |
| | | | | | | 07/28/1980 | | <4 | 3 | 3 | NCDH |
| | | | | | | 06/24/1981 | <25 | 4 | 4 | 8 | NCDH |
| | | | | | | 05/19/1982 | <25 | 4 | 3 | 9 | NCDH |
| | | | | | | 08/09/1983 | <4 | 3 | 3 | 6 | NCDH |
| | | | | | | " | 3 | 7 | <1 | 10 | NWQL |
| | | | | | | 04/23/1984 | <4 | 5 | 4 | 9 | NCDH |
| | | | | | | " | <3 | 5 | 3 | 8 | NWQL |
| | | | | | | 08/07/1984 | <4 | 3 | 3 | 6 | NCDH |
| N-6994 | | | | | | | | | | | |
| N-8050 | M | 300-328 | 8 | Abandoned | Bernhardt & Stein | 06/23/1981 | 975 | 3,700 | 61 | 4,800 | NCDH |
| | | | | | | 05/18/1982 | 1,500 | 2,400 | 54 | 4,100 | NCDH |
| | | | | | | 08/04/1983 | 720 | 2,100 | 34 | 2,900 | NCDH |
| | | | | | | " | 1,400 | 13,000 | 36 | 14,000 | NWQL |
| | | | | | | 05/02/1984 | 2,800 | 38,000 | 87 | 41,000 | NCDH |
| | | | | | | " | 2,500 | 23,000 | 77 | 26,000 | NWQL |
| | | | | | | 08/07/1984 | 1,100 | 13,000 | 47 | 14,000 | NCDH |

300254

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-8068 | M | 265-291 | 10 | | VMI | 07/29/1980 | | 8 | 2 | 23 | NCDH |
| | | | | | | 09/30/1980 | <30 | 9 | 2 | 220 | NCDH |
| | | | | | | 06/02/1982 | <25 | 1 | 1 | 2 | NCDH |
| | | | | | | 08/09/1983 | 8 | 14 | 4 | 42 | NCDH |
| | | | | | | 04/02/1984 | 4 | 15 | 3 | 37 | NCDH |
| N-8458 | M | 290-350 | 12 | Abandoned Fall 97 | Pembrook Manag | 10/10/1979 | | 62 | 15 | 79 | NCDH |
| | | | | | | 07/28/1980 | | 44 | 9 | 53 | NCDH |
| | | | | | | 06/23/1981 | <25 | 43 | 19 | 65 | NCDH |
| | | | | | | 05/12/1982 | <25 | 32 | 11 | 45 | NCDH |
| | | | | | | 08/09/1983 | 9 | 51 | 19 | 84 | NCDH |
| | | | | | | 04/26/1984 | <4 | 39 | 16 | 60 | NCDH |
| | | | | | | 08/07/1984 | <4 | 37 | 2 | 64 | NCDH |
| | | | | | | 10/18/1985 | <4 | 33 | 14 | 49 | EcoTest |
| N-9310 | M | 180-230 | 12 | | VMI | 12/05/1979 | | 9 | <2 | 46 | NCDH |
| | | | | | | 07/28/1980 | | 29 | 2 | 63 | NCDH |
| | | | | | | 02/17/1981 | <5 | 140 | 9 | 200 | NCDH |
| | | | | | | 08/07/1981 | <10 | 52 | <2 | 47 | NCDH |
| | | | | | | 05/18/1982 | <25 | 340 | 8 | 400 | NCDH |
| | | | | | | 08/09/1983 | 42 | 370 | 11 | 450 | NCDH |
| | | | | | | 04/26/1984 | 120 | 1,300 | 12 | 1,500 | NCDH |
| | | | | | | " | 160 | 950 | 9 | 1,200 | NWQL |
| | | | | | | 08/08/1984 | 73 | 810 | 19 | 930 | NCDH |
| N-9311 | M | 189-229 | 12 | | VMI | 12/05/1979 | | 930 | 2 | 930 | NCDH |
| | | | | | | 07/28/1980 | | 2,200 | 6 | 2,200 | NCDH |
| | | | | | | 02/17/1981 | <5 | 400 | 1 | 400 | NCDH |
| | | | | | | 08/07/1981 | 200 | 2,000 | 12 | 2,200 | NCDH |
| | | | | | | 05/18/1982 | 150 | 1,300 | 3 | 1,500 | NCDH |
| | | | | | | 08/09/1983 | 190 | 990 | 4 | 1,200 | NCDH |
| | | | | | | " | 490 | 2,800 | 10 | 3,300 | NCDH |
| | | | | | | 04/19/1984 | 78 | 550 | 2 | 630 | NCDH |
| | | | | | | " | 97 | 450 | <3 | 550 | NCDH |

300255

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 08/08/1984 | 530 | 3,000 | 10 | 3,500 | NCDH |
| N-10043 | | | | | | | | | | | |
| N-10204 | | | | | | | | | | | |

300256

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| WATER SUPPLY WELLS | | | | | | | | | | | |
| N-79 | M | 338-428 | 10 | Active | Village of Hempstead | 11/15/1977 | | <4 | <2 | bdl | |
| Local # 2 | | | | Capacity - 1275 gpm | | 12/14/1978 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/05/1979 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/10/1980 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/17/1981 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/23/1982 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/29/1983 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/11/1984 | <4 | bdl | <1 | bdl | NCDH |
| | | | | | | 04/02/1984 | <4 | <3 | <1 | bdl | NCDH |
| | | | | | | 02/04/1985 | | <1 | <1 | bdl | |
| | | | | | | 11/25/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/10/1987 | <1 | <1 | <1 | bdl | |
| | | | | | | 09/20/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 01/04/1989 | <1 | <1 | <1 | bdl | |
| | | | | | | 03/07/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1989 | <0.5 | 1 | 1 | 2 | |
| | | | | | | 09/12/1989 | <0.5 | 1 | 3 | 4 | |
| | | | | | | 11/22/1989 | <0.5 | 2 | 5 | 6 | |
| | | | | | | 03/20/1990 | <0.5 | 1 | 5 | 7 | |
| | | | | | | 06/18/1990 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/21/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 08/31/1990 | <0.5 | 1 | 3 | 4 | |
| | | | | | | 09/18/1990 | <0.5 | <0.5 | 2 | 2 | |
| | | | | | | 11/21/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 03/26/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/18/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/10/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/03/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/10/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/09/1993 | <0.5 | <0.5 | <0.5 | bdl | |

300257

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 01/11/1994 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/14/1995 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/12/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 04/10/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/17/1998 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/23/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/12/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/17/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/16/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/09/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/08/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 03/23/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/08/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| N-80 | M | 428-478 | 16 | Active | Village of Hempstead | 11/16/1977 | | <4 | <2 | bdl | |
| Local # 3 | | | | Capacity - 900 gpm | | 05/17/1978 | | <1 | <1 | bdl | |
| | | | | | | 11/07/1979 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/10/1980 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/17/1981 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/23/1982 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/06/1983 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/11/1984 | <4 | <1 | <1 | bdl | NCDH |
| | | | | | | 11/19/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/09/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/17/1987 | <1 | <1 | <1 | bdl | |
| | | | | | | 03/01/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/13/1990 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/21/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 05/22/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/09/1993 | <0.5 | <0.5 | <0.5 | bdl | |

300258

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 02/15/1994 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/13/1995 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/05/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/17/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/10/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/11/1997 | <0.5 | <0.5 | <0.5 | 1 | |
| | | | | | | 06/03/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/27/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/02/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/02/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/09/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/15/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/01/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/18/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 03/09/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/15/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/14/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/08/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/12/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-81 | M | 360-420 | 28 | Active | Village of Hempstead | 11/15/1977 | | <4 | <2 | bdl | |
| Local # 4 | | | | Capacity - 1000 gpm | | 01/05/1978 | | <4 | <2 | bdl | |
| | | | | | | 11/05/1979 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/10/1980 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/17/1981 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/18/1982 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/01/1983 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/22/1983 | <1 | <1 | <1 | 1 | |
| | | | | | | 06/04/1984 | | <1 | <1 | bdl | |
| | | | | | | 01/18/1984 | <15 | <1 | <1 | bdl | NCDH |

300259

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 11/20/1984 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/12/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/25/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/09/1988 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/11/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/15/1990 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/29/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/11/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/09/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/09/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 11/24/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/16/1993 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/24/1993 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/09/1993 | <0.5 | <0.5 | <0.5 | 4 | |
| | | | | | | 09/15/1993 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 09/23/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/14/1993 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 01/11/1994 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 06/24/1994 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 09/20/1994 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 12/29/1994 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 03/14/1995 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/08/1995 | <0.5 | <0.5 | <0.5 | 1 | |
| | | | | | | 09/19/1995 | <0.5 | <0.5 | <0.5 | 3 | |
| | | | | | | 11/14/1995 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 03/07/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/05/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/18/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/10/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/11/1997 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 06/11/1997 | <0.5 | <0.5 | <0.5 | bdl | |



300260

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 09/24/1997 | <0.5 | <0.5 | <0.5 | 2 | |
| | | | | | | 12/02/1997 | <0.5 | <0.5 | <0.5 | 3 | |
| | | | | | | 03/17/1998 | <0.5 | <0.5 | <0.5 | 2 | H2M |
| | | | | | | 06/23/1998 | <0.5 | <0.5 | <0.5 | 1 | H2M |
| | | | | | | 09/15/1998 | <0.5 | <0.5 | <0.5 | 3 | H2M |
| | | | | | | 12/08/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 03/09/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/08/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/14/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/10/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/15/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/20/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/12/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-82 | M | 390-542 | ? | Active | Village of Hempstead | 11/16/1977 | <4 | <2 | | bdl | |
| Local # 5 | | | | Capacity - 1000 gpm | | 12/15/1978 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/05/1979 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/10/1980 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/29/1981 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/30/1982 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/29/1983 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/11/1984 | <4 | <1 | <1 | bdl | NCDH |
| | | | | | | 11/20/1984 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/12/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/09/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/24/1987 | <1 | <1 | <1 | bdl | |
| | | | | | | 03/08/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/14/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/13/1990 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/26/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/11/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/16/1993 | <0.5 | <0.5 | <0.5 | bdl | |

300261

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 01/11/1994 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/13/1995 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/11/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/17/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/16/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/15/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/08/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/18/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 03/10/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/08/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/10/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/15/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/20/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/20/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-83 | M | 363-403 | 28 | Active w/ | Village of Hempstead | 11/16/1977 | | 27 | <2 | 27 | |
| Local # 6 | | | | Air Stripper | | 12/28/1977 | | 71 | <2 | 71 | |
| | | | | Capacity - 1000 gpm | | 01/05/1978 | | 51 | <2 | 51 | |
| | | | | | | 06/29/1978 | <1 | 44 | <1 | 44 | |
| | | | | | | 08/01/1978 | | 9 | <1 | 9 | |
| | | | | | | 12/15/1978 | <1 | 145 | <1 | 145 | |
| | | | | | | 06/08/1979 | <1 | 68 | <1 | 68 | |
| | | | | | | 10/29/1979 | | 47 | <1 | 47 | |
| | | | | | | 05/20/1980 | | 97 | 2 | 99 | |
| | | | | | | 07/08/1980 | | 64 | 1 | 65 | |
| | | | | | | 03/24/1981 | <1 | 22 | 2 | 24 | |
| | | | | | | 04/29/1982 | | 11 | 5 | 16 | |
| | | | | | | 04/14/1983 | | 11 | 10 | 21 | |
| | | | | | | 11/22/1983 | | 5 | | 10 | |
| | | | | | | 04/02/1984 | | 29 | 15 | 44 | NCDH |
| | | | | | | 04/23/1985 | | 13 | 6 | 19 | |

300262

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 08/08/1986 | <10 | 5 | 4 | 9 | |
| | | | | | | 12/15/1987 | | 9 | | 9 | |
| | | | | | | 09/27/1988 | | 14 | 10 | 24 | |
| | | | | | | 03/14/1998 | <1 | 11 | 10 | 21 | |
| | | | | | | 12/12/1989 | <1 | 14 | 17 | 31 | |
| | | | | | | 06/18/1991 | <1 | <0.5 | 1 | 1 | |
| | | | | | | 07/16/1991 | 1 | 12 | 8 | 9 | |
| | | | | | | 10/22/1991 | 1 | 9 | 6 | 16 | |
| | | | | | | 04/09/1992 | <0.5 | 9 | 6 | 15 | |
| | | | | | | 11/04/1992 | 1 | 12 | 8 | 21 | |
| | | | | | | 02/03/1993 | <0.5 | 11 | 6 | 18 | |
| | | | | | | 09/08/1993 | 1 | 10 | 4 | 16 | |
| | | | | | | 01/11/1994 | 1 | 13 | 5 | 20 | |
| | | | | | | 07/19/1994 | 1 | 4 | 9 | 13.8 | |
| | | | | | | 12/13/1994 | 1 | 12 | 4 | 18.4 | |
| | | | | | | 03/07/1995 | 1 | 14 | 4 | 20 | |
| | | | | | | 06/06/1995 | 1 | 13 | 4 | 17 | |
| | | | | | | 09/15/1995 | 1 | 14 | 4 | 20 | |
| | | | | | | 12/05/1995 | 1 | 14 | 4 | 19 | |
| | | | | | | 03/07/1996 | <0.5 | 12 | 3 | 15 | |
| | | | | | | 06/05/1996 | <0.5 | 10 | 16 | 26 | |
| | | | | | | 09/17/1996 | 1 | 13 | 3 | 17 | |
| | | | | | | 12/03/1996 | 1 | 21 | 4 | 26 | |
| | | | | | | 03/04/1997 | <0.5 | 18 | 4 | 22 | |
| | | | | | | 06/03/1997 | <0.5 | 17 | 4 | 21 | |
| | | | | | | 09/16/1997 | <0.5 | 13 | 3 | 16 | |
| | | | | | | 12/22/1997 | <0.5 | 11 | 2 | 13 | |
| | | | | | | 03/17/1998 | 0.8 | 13 | 3 | 16.8 | H2M |
| | | | | | | 06/16/1998 | 0.6 | 13 | 3.1 | 17.9 | H2M |
| | | | | | | 09/09/1998 | 0.6 | 13 | 3.1 | 16.7 | H2M |
| | | | | | | 12/08/1998 | 0.9 | 13 | 3.6 | 18.5 | H2M |

300263

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 09/21/1999 | <0.5 | 5 | 2 | 6 | |
| | | | | | | 12/10/1999 | 1 | 9 | 2 | 13 | |
| | | | | | | 03/14/1900 | <0.5 | 7 | 2 | 10 | |
| | | | | | | 06/13/1900 | 1 | 15 | 3 | 19 | |
| | | | | | | 09/12/1900 | <0.5 | 10 | 2 | 12 | |
| N-3668 | M | 450-500 | | Active | Village of Hempstead | 09/22/1977 | | <4 | <2 | bdl | |
| Local # 7 | | | | Capacity - 1200 gpm | | 12/12/1977 | | <4 | <2 | bdl | |
| | | | | | | 06/27/1978 | | <4 | <2 | bdl | |
| | | | | | | 12/15/1978 | 1 | <1 | <1 | 2 | |
| | | | | | | 11/07/1979 | <1 | <1 | <1 | <1 | |
| | | | | | | | No other VOC detections | | | | |
| | | | | | | 03/14/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/20/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-3934 | M | 377-417 | 18 | Active w/ | Village of Garden City | 09/20/1977 | | 7 | | 7 | |
| Local # 10 | | | | air Stripper | | 12/29/1977 | | <4 | | <4 | |
| | | | | Capacity - 1400 gpm | | 03/21/1978 | | 10 | 1 | 11 | |
| | | | | | | 10/17/1978 | <1 | 11 | 1 | 12 | |
| | | | | | | 11/06/1978 | | 9 | 1 | 12 | |
| | | | | | | 10/02/1979 | | 10 | 1 | 11 | |
| | | | | | | 04/10/1980 | | 6 | <2 | 6 | |
| | | | | | | 10/06/1980 | <30 | 11 | 4 | 20 | NCDH |
| | | | | | | 09/23/1980 | <1 | 12 | 2 | 16 | NCDH |
| | | | | | | 05/13/1981 | | 5 | 2 | 9 | NCDH |
| | | | | | | 10/13/1981 | <1 | 8 | 2 | 14 | NCDH |
| | | | | | | 03/16/1982 | | 6 | 2 | 14 | NCDH |
| | | | | | | 09/21/1982 | <1 | 7 | <1 | 7 | |
| | | | | | | 01/20/1983 | | 5 | 1 | 6 | |
| | | | | | | 08/24/1983 | <4 | 9 | 1 | 13 | NCDH |
| | | | | | | 10/11/1983 | <1 | 8 | | 8 | |
| | | | | | | 04/13/1984 | <4 | 17 | 2 | 22 | NCDH |

300264

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 07/13/1984 | | 18 | 3 | 21 | |
| | | | | | | 10/23/1984 | >1 | 20 | | 20 | |
| | | | | | | 05/01/1985 | | 36 | 2 | 38 | |
| | | | | | | 07/09/1985 | | 33 | 6 | 39 | |
| | | | | | | 05/27/1986 | | 38 | | 49 | |
| | | | | | | 07/17/1986 | <15 | 37 | 2 | 39 | |
| | | | | | | 02/27/1987 | <7 | 6 | <1 | 6 | |
| | | | | | | 05/05/1987 | | 53 | | 74 | |
| | | | | | | 07/07/1987 | | 59 | <1 | 59 | |
| | | | | | | 07/02/1988 | | 95 | | 95 | |
| | | | | | | 12/07/1988 | <0.5 | 81 | 6 | 87 | |
| | | | | | | 05/19/1989 | <0.5 | 60 | 13 | 73 | |
| | | | | | | 08/10/1989 | <0.5 | 81 | 13 | 110 | |
| | | | | | | 11/09/1989 | <0.5 | 120 | 33 | 181 | |
| | | | | | | 12/12/1989 | <0.5 | 110 | 34 | 184 | |
| | | | | | | 01/23/1990 | <0.5 | 120 | 41 | 220 | |
| | | | | | | 02/27/1990 | <0.5 | 86 | 51 | 139 | |
| | | | | | | 03/13/1990 | 10 | 140 | 84 | 300 | H2M |
| | | | | | | 04/19/1990 | 7 | 180 | 92 | 338 | H2M |
| | | | | | | 05/15/1990 | 6 | 110 | 83 | 244 | H2M |
| | | | | | | 06/05/1990 | 240 | 150 | 81 | 471 | |
| | | | | | | 07/16/1990 | 6 | 160 | 77 | 284 | H2M |
| | | | | | | 08/13/1990 | 9 | 210 | 93 | 366 | H2M |
| | | | | | | 09/17/1990 | 10 | 180 | 75 | 350 | H2M |
| | | | | | | 10/15/1990 | | 230 | 100 | 377 | |
| | | | | | | 11/19/1990 | | 110 | 87 | 197 | |
| | | | | | | 12/17/1990 | | 140 | 170 | 261 | |
| | | | | | | 01/17/1991 | 14 | 260 | 130 | 404 | |
| | | | | | | 02/14/1991 | 16 | 260 | 180 | 461 | |
| | | | | | | 03/18/1991 | 8 | 110 | 140 | 258 | |
| | | | | | | 05/13/1991 | 22 | 350 | 170 | 556 | |

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL (feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 06/24/1991 | 9 | 110 | 200 | 319 | |
| | | | | | | 07/19/1991 | 12 | 160 | 230 | 402 | |
| | | | | | | 09/20/1991 | <0.5 | 420 | 300 | 720 | |
| | | | | | | 10/15/1991 | 23 | 340 | 290 | 630 | |
| | | | | | | 11/18/1991 | 21 | 330 | 270 | 621 | |
| | | | | | | 01/20/1992 | 41 | 480 | 340 | 861 | |
| | | | | | | 02/19/1992 | 32 | 420 | 310 | 762 | |
| | | | | | | 03/23/1992 | 38 | 470 | 340 | 850 | |
| | | | | | | 04/13/1992 | 40 | 470 | 330 | 842 | |
| | | | | | | 05/18/1992 | 38 | 460 | 340 | 839 | |
| | | | | | | 06/16/1992 | 35 | 420 | 310 | 766 | |
| | | | | | | 07/13/1992 | 43 | 480 | 340 | 865 | |
| | | | | | | 08/17/1992 | 30 | 400 | 370 | 802 | |
| | | | | | | 10/19/1992 | 29 | 380 | 390 | 800 | |
| | | | | | | 11/16/1992 | 27 | 330 | 470 | 827 | |
| | | | | | | 12/14/1992 | | 280 | 440 | 720 | |
| | | | | | | 01/21/1993 | 57 | 320 | 550 | 931 | |
| | | | | | | 02/16/1993 | 51 | 570 | 440 | 1,062 | |
| | | | | | | 03/15/1993 | 58 | 580 | 360 | 1,000 | |
| | | | | | | 04/19/1993 | 9 | 94 | 520 | 621 | |
| | | | | | | 05/23/1993 | 34 | 580 | 500 | 1,193 | H2M |
| | | | | | | 05/24/1993 | 45 | 720 | 500 | 1,343 | H2M |
| | | | | | | 06/14/1993 | 14 | 350 | 420 | 784 | |
| | | | | | | 10/21/1993 | 48 | 330 | 640 | 1,030 | |
| | | | | | | 11/23/1993 | 66 | 560 | 470 | 1,096 | |
| | | | | | | 12/06/1993 | 37 | 630 | 720 | 1,390 | |
| | | | | | | 01/17/1994 | 68 | 840 | 470 | 1,384 | |
| | | | | | | 03/15/1994 | 56 | 690 | 560 | 1,311 | |
| | | | | | | 04/13/1994 | 46 | 520 | 540 | 1,110 | |
| | | | | | | 05/15/1994 | 37 | 460 | 510 | 1,008 | |
| | | | | | | 06/15/1994 | 100 | 720 | 680 | 1,512 | |

300266

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 07/11/1994 | 46 | 660 | 480 | 1,188 | |
| | | | | | | 08/15/1994 | 16 | 130 | 320 | 468 | |
| | | | | | | 10/18/1994 | 17 | 120 | 290 | 428 | |
| | | | | | | 11/03/1994 | 20 | 150 | 340 | 610 | |
| | | | | | | 12/13/1994 | 13 | 100 | 380 | 497 | |
| | | | | | | 01/16/1995 | 15 | 150 | 430 | 600 | |
| | | | | | | 02/14/1995 | 27 | 260 | 420 | 710 | |
| | | | | | | 03/13/1995 | 38 | 630 | 640 | 1,308 | |
| | | | | | | 04/17/1995 | 26 | 400 | 520 | 946 | |
| | | | | | | 05/15/1995 | 20 | 270 | 500 | 790 | |
| | | | | | | 07/18/1995 | 56 | 610 | 310 | 978 | |
| | | | | | | 08/31/1995 | 49 | 600 | 420 | 1,076 | |
| | | | | | | 09/26/1995 | 29 | 340 | 570 | 946 | |
| | | | | | | 04/11/1996 | 95 | 1,400 | 750 | 2,260 | |
| | | | | | | 09/04/1998 | 11 | 130 | 380 | 570 | H2M |
| | | | | | | 10/08/1998 | 14 | 170 | 1,100 | 1,417 | H2M |
| | | | | | | 05/24/1999 | 6 | 150 | 660 | 839 | H2M |
| | | | | | | 06/17/1999 | 13 | 155 | 360 | 562 | H2M |
| | | | | | | 07/07/1999 | 28 | 320 | 510 | 890 | H2M |
| | | | | | | 07/26/1999 | 35 | 400 | 470 | 932 | H2M |
| | | | | | | 08/11/1999 | 44 | 370 | 420 | 875 | H2M |
| | | | | | | 09/17/1999 | 37 | 400 | 480 | 1,024 | |
| | | | | | | 10/07/1999 | 25 | 270 | 440 | 737 | |
| | | | | | | 11/15/1999 | 7 | 89 | 510 | 611 | |
| | | | | | | 12/21/1999 | 6 | 93 | 400 | 503 | |
| | | | | | | 01/07/1900 | 2 | 140 | 430 | 584 | |
| | | | | | | 02/29/1900 | 27 | 280 | 370 | 580 | |
| | | | | | | 03/20/1900 | 24 | 290 | 480 | 905 | |
| | | | | | | 04/12/1900 | 32 | 370 | 390 | 793 | |
| | | | | | | 05/15/1900 | 39 | 450 | 330 | 822 | |
| | | | | | | 06/12/1900 | 45 | 470 | 290 | 706 | |

300267

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 07/24/1900 | 30 | 340 | 260 | 631 | |
| | | | | | | 08/23/1900 | 20 | 280 | 280 | 521 | |
| | | | | | | 09/26/1900 | 21 | 240 | 230 | 474 | |
| N-3935 | M | 370-410 | 18 | Active w/ | Village of Garden City | 09/20/1977 | | 9 | <2 | 9 | |
| Local # 11 | | | | Air Stripper | | 12/14/1997 | | 8 | <2 | 8 | |
| | | | | Capacity - 1400 gpm | | 03/21/1978 | | 11 | 1 | 12 | |
| | | | | | | 11/08/1978 | 1 | 13 | 1 | 15 | |
| | | | | | | 09/11/1979 | | 12 | 1 | 27 | NCDH |
| | | | | | | 08/29/1980 | | 11 | 2 | 17 | NCDH |
| | | | | | | 09/09/1980 | 1 | 15 | <1 | 16 | |
| | | | | | | 10/06/1980 | <30 | 14 | 5 | 24 | NCDH |
| | | | | | | 05/27/1981 | | 10 | 2 | 12 | |
| | | | | | | 09/15/1981 | | 14 | 5 | 24 | NCDH |
| | | | | | | 09/14/1982 | 1 | 13 | | 14 | |
| | | | | | | 10/06/1982 | | 10 | 2 | 12 | |
| | | | | | | 01/17/1983 | | 14 | 2 | 16 | |
| | | | | | | 08/24/1983 | <4 | 15 | 2 | 24 | NCDH |
| | | | | | | 09/06/1983 | | 13 | | 13 | |
| | | | | | | 04/11/1984 | <4 | 18 | 3 | 27 | NCDH |
| | | | | | | 10/16/1984 | | 21 | | 21 | |
| | | | | | | 04/05/1985 | | 30 | 5 | 37 | |
| | | | | | | 05/07/1985 | | 33 | 5 | 45 | |
| | | | | | | 06/06/1985 | | 25 | 4 | 37 | |
| | | | | | | 07/17/1986 | | 18 | | 18 | |
| | | | | | | 05/07/1987 | | 23 | | 44 | |
| | | | | | | 09/26/1988 | | 48 | 4 | 152 | |
| | | | | | | 05/30/1989 | | 62 | 2 | 64 | |
| | | | | | | 07/14/1989 | 1 | 59 | 3 | 63 | |
| | | | | | | 12/27/1989 | | 41 | 4 | 102 | |
| | | | | | | 02/22/1990 | | 74 | 5 | 169 | |
| | | | | | | 03/06/1990 | | 53 | 5 | 73 | |

300268

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 04/17/1990 | 3 | 78 | 5 | 222 | H2M |
| | | | | | | 05/15/1990 | 3 | 88 | 6 | 222 | H2M |
| | | | | | | 06/05/1990 | 3 | 70 | 6 | 154 | H2M |
| | | | | | | 07/10/1990 | 4 | 65 | 6 | 96 | |
| | | | | | | 07/23/1990 | bdl | 81 | 6 | 172 | H2M |
| | | | | | | 08/13/1990 | 5 | 40 | 8 | 61 | H2M |
| | | | | | | 09/17/1990 | 5 | 35 | 6 | 53 | H2M |
| | | | | | | 10/15/1990 | | 42 | 7 | 53 | |
| | | | | | | 11/19/1990 | 1 | 85 | 5 | 141 | |
| | | | | | | 12/17/1990 | | 94 | 7 | 169 | |
| | | | | | | 01/14/1991 | 7 | 100 | 7 | 184 | |
| | | | | | | 02/12/1991 | 8 | 120 | 8 | 231 | |
| | | | | | | 03/19/1991 | 7 | 110 | 7 | 198 | |
| | | | | | | 04/23/1991 | 7 | 110 | 8 | 196 | |
| | | | | | | 05/21/1991 | 7 | 130 | 7 | 215 | |
| | | | | | | 06/17/1991 | 9 | 130 | 7 | 206 | |
| | | | | | | 07/19/1991 | 16 | 240 | 26 | 317 | |
| | | | | | | 09/26/1991 | 11 | 140 | 13 | 212 | |
| | | | | | | 10/15/1991 | 17 | 190 | 16 | 274 | |
| | | | | | | 11/18/1991 | 15 | 160 | 12 | 232 | |
| | | | | | | 12/16/1991 | 18 | 180 | 12 | 266 | |
| | | | | | | 01/20/1992 | 30 | 260 | 14 | 392 | |
| | | | | | | 02/19/1992 | 23 | 240 | 13 | 343 | |
| | | | | | | 03/23/1992 | 25 | 240 | 11 | 348 | |
| | | | | | | 04/21/1992 | 28 | 270 | 11 | 375 | |
| | | | | | | 05/18/1992 | 30 | 280 | 11 | 356 | |
| | | | | | | 07/13/1992 | 30 | 250 | 10 | 335 | |
| | | | | | | 08/11/1992 | 19 | 190 | 8 | 156 | |
| | | | | | | 10/19/1992 | 26 | 240 | 9 | 313 | |
| | | | | | | 11/19/1992 | 36 | 313 | 10 | 365 | |
| | | | | | | 12/14/1992 | | 330 | 11 | 347 | |

300269

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 01/11/1993 | 10 | 110 | 13 | 148 | |
| | | | | | | 02/16/1993 | 29 | 250 | 12 | 317 | |
| | | | | | | 03/15/1993 | 8 | 140 | 17 | 166 | |
| | | | | | | 04/19/1993 | 8 | 480 | 72 | 603 | |
| | | | | | | 05/10/1993 | 4 | 140 | 17 | 169 | |
| | | | | | | 06/10/1993 | 12 | 480 | 34 | 585 | |
| | | | | | | 07/09/1993 | 43 | 490 | 59 | 618 | |
| | | | | | | 08/10/1993 | 40 | 490 | 99 | 708 | |
| | | | | | | 09/10/1993 | 43 | 510 | 120 | 687 | |
| | | | | | | 10/27/1993 | 57 | 550 | 160 | 778 | |
| | | | | | | 11/22/1993 | 53 | 630 | 180 | 875 | |
| | | | | | | 01/17/1994 | 5 | 200 | 23 | 267 | |
| | | | | | | 02/15/1994 | 23 | 24 | 21 | 302 | |
| | | | | | | 03/15/1994 | 44 | 340 | 17 | 418 | |
| | | | | | | 04/11/1994 | 56 | 570 | 38 | 686 | |
| | | | | | | 05/10/1994 | 44 | 530 | 120 | 708 | |
| | | | | | | 06/15/1994 | 99 | 760 | 240 | 1,147 | |
| | | | | | | 07/11/1994 | 47 | 390 | 45 | 505 | |
| | | | | | | 08/15/1994 | 52 | 430 | 36 | 534 | |
| | | | | | | 10/18/1994 | 50 | 400 | 130 | 597 | |
| | | | | | | 11/03/1994 | 51 | 540 | 160 | 751 | |
| | | | | | | 12/12/1994 | 52 | 630 | 160 | 848 | |
| | | | | | | 01/16/1995 | 46 | 700 | 130 | 890 | |
| | | | | | | 02/14/1995 | 51 | 570 | 140 | 774 | |
| | | | | | | 03/13/1995 | 43 | 580 | 97 | 828 | |
| | | | | | | 04/17/1995 | 41 | 540 | 52 | 647 | |
| | | | | | | 05/15/1995 | 40 | 540 | 33 | 624 | |
| | | | | | | 07/18/1995 | 12 | 320 | 36 | 383 | |
| | | | | | | 09/18/1995 | 58 | 530 | 36 | 642 | |
| | | | | | | 04/11/1996 | 80 | 910 | 30 | 1,086 | |
| | | | | | | 05/20/1996 | 57 | 780 | 41 | 885 | |

300270

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 06/15/1996 | 40 | 680 | 90 | 817 | |
| | | | | | | 07/29/1996 | 32 | 710 | 130 | 877 | |
| | | | | | | 08/19/1996 | 42 | 520 | 170 | 750 | |
| | | | | | | 09/16/1996 | 38 | 540 | 190 | 793 | |
| | | | | | | 10/14/1996 | 51 | 490 | 160 | 713 | |
| | | | | | | 11/14/1996 | 41 | 610 | 180 | 839 | |
| | | | | | | 12/16/1996 | 56 | 800 | 160 | 1,027 | |
| | | | | | | 01/13/1997 | 63 | 660 | 200 | 929 | |
| | | | | | | 02/18/1997 | 46 | 660 | 160 | 881 | |
| | | | | | | 03/24/1997 | 48 | 550 | 200 | 814 | |
| | | | | | | 04/21/1997 | 56 | 560 | 210 | 843 | |
| | | | | | | 05/19/1997 | 60 | 570 | 230 | 872 | |
| | | | | | | 06/17/1997 | 30 | 620 | 190 | 853 | |
| | | | | | | 07/18/1997 | 64 | 750 | 250 | 1,083 | |
| | | | | | | 09/26/1997 | 54 | 590 | 240 | 902 | |
| | | | | | | 01/05/1998 | 58 | 710 | 240 | 1,021 | |
| | | | | | | 02/10/1998 | 58 | 590 | 210 | 878 | |
| | | | | | | 03/03/1998 | 55 | 640 | 230 | 937 | |
| | | | | | | 04/08/1998 | 59 | 580 | 240 | 896 | |
| | | | | | | 05/15/1998 | 55 | 640 | 220 | 628 | |
| | | | | | | 06/01/1998 | 53 | 620 | 210 | 899 | |
| | | | | | | 07/20/1998 | 45 | 480 | 220 | 751 | |
| | | | | | | 08/17/1998 | 54 | 520 | 220 | 807 | |
| | | | | | | 10/19/1998 | 50 | 450 | 200 | 716 | |
| | | | | | | 11/04/1998 | 57 | 530 | 220 | 822 | |
| | | | | | | 12/14/1998 | 63 | 480 | 210 | 767 | |
| | | | | | | 01/19/1999 | 47 | 500 | 210 | 765 | |
| | | | | | | 02/10/1999 | 34 | 370 | 170 | 576 | |
| | | | | | | 03/23/1999 | 29 | 430 | 180 | 645 | |
| | | | | | | 04/27/1999 | 5 | 360 | 190 | 586 | |
| | | | | | | 05/10/1999 | 47 | 440 | 190 | 684 | |

300271

EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL (feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 06/14/1999 | 34 | 310 | 140 | 505 | |
| | | | | | | 07/12/1999 | 4 | 380 | 110 | 502 | |
| | | | | | | 08/16/1999 | 41 | 330 | 54 | 439 | |
| | | | | | | 09/10/1999 | 34 | 350 | 54 | 459 | |
| | | | | | | 10/05/1999 | 33 | 340 | 37 | 417 | |
| | | | | | | 11/15/1999 | 35 | 300 | 55 | 400 | |
| | | | | | | 01/04/1900 | 43 | 410 | 110 | 575 | |
| | | | | | | 02/15/1900 | 32 | 310 | 45 | 394 | |
| | | | | | | 03/06/1900 | 41 | 380 | 67 | 491 | |
| | | | | | | 04/24/1900 | 37 | 360 | 34 | 445 | |
| | | | | | | 05/01/1900 | 41 | 410 | 36 | 501 | |
| | | | | | | 06/01/1900 | 13 | 190 | 21 | 241 | |
| | | | | | | 07/31/1900 | 27 | 290 | 27 | 359 | |
| | | | | | | 08/16/1900 | <0.5 | 300 | 22 | 331 | |
| | | | | | | 09/25/1900 | 29 | 290 | 28 | 358 | |
| N-4425 | M | 325-365 | 20 | Active w/ | Village of Hempstead | 12/12/1977 | | 23 | <2 | 23 | |
| Local # 1R | | | | Air Stripper | | 01/05/1978 | | 20 | <2 | 20 | |
| | | | | Capacity - 1200 gpm | | 12/14/1978 | <1 | 32 | <1 | 32 | |
| | | | | | | 11/05/1979 | <1 | 24 | <1 | 24 | |
| | | | | | | 03/27/1980 | | 15 | <1 | 15 | |
| | | | | | | 06/10/1980 | <1 | 32 | 1 | 33 | |
| | | | | | | 05/13/1981 | | 17 | 2 | 19 | |
| | | | | | | 03/03/1982 | | 15 | 3 | 18 | |
| | | | | | | 12/13/1982 | | 23 | 4 | 27 | |
| | | | | | | 06/01/1983 | | 22 | 5 | 27 | |
| | | | | | | 11/14/1984 | <15 | 19 | 8 | 27 | NCDH |
| | | | | | | 02/05/1984 | | 17 | 8 | 25 | |
| | | | | | | 01/22/1986 | | 17 | 14 | 31 | |
| | | | | | | 01/13/1987 | <4 | 33 | 36 | 69 | |
| | | | | | | 06/10/1987 | <9 | 14 | 24 | 38 | |
| | | | | | | 06/15/1988 | <8 | 13 | 31 | 44 | |



300272

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 09/07/1988 | <11 | 36 | 86 | 124 | |
| | | | | | | 12/21/1988 | <0.5 | 16 | 45 | 65 | |
| | | | | | | 03/14/1989 | <0.5 | 9 | 31 | 41 | |
| | | | | | | 06/20/1989 | | 8 | 27 | 35 | |
| | | | | | | 09/27/1989 | | 12 | 38 | 50 | |
| | | | | | | 12/12/1989 | <0.5 | 14 | 34 | 50 | |
| | | | | | | 05/23/1990 | 2 | 9 | 44 | 55 | |
| | | | | | | 09/18/1990 | | 15 | 47 | 62 | |
| | | | | | | 01/30/1991 | | 7 | 52 | 59 | |
| | | | | | | 04/22/1991 | 1 | 14 | 68 | 83 | |
| | | | | | | 08/08/1991 | 1 | 13 | 61 | 75 | |
| | | | | | | 11/14/1991 | 1 | 18 | 99 | 127 | |
| | | | | | | 01/14/1992 | 1 | 12 | 62 | 75 | |
| | | | | | | 04/02/1992 | <0.5 | 6 | 41 | 47 | |
| | | | | | | 07/02/1992 | <0.5 | 9 | 49 | 51 | |
| | | | | | | 12/03/1992 | <0.5 | 9 | 49 | 51 | |
| | | | | | | 03/09/1993 | <0.5 | 8 | 41 | 52 | |
| | | | | | | 06/01/1993 | <0.5 | 10 | 50 | 64 | |
| | | | | | | 09/07/1993 | <0.5 | 8 | 43 | 56 | |
| | | | | | | 12/07/1993 | <0.5 | 8 | 34 | 45 | |
| | | | | | | 03/08/1994 | <0.5 | 7 | 30 | 41 | |
| | | | | | | 06/07/1994 | <0.5 | 6 | 33 | 44 | |
| | | | | | | 09/07/1994 | <0.5 | 9 | 39 | 50 | |
| | | | | | | 12/13/1994 | <0.5 | 6 | 36 | 46 | |
| | | | | | | 03/07/1995 | <0.5 | 9 | 37 | 53 | |
| | | | | | | 06/06/1995 | <0.5 | 14 | 65 | 84 | |
| | | | | | | 09/12/1995 | <0.5 | 8 | 42 | 53 | |
| | | | | | | 12/05/1995 | <0.5 | 6 | 31 | 39 | |
| | | | | | | 03/07/1996 | <0.5 | 5 | 24 | 29 | |
| | | | | | | 06/05/1996 | <0.5 | 6 | 27 | 33 | |
| | | | | | | 09/17/1996 | <0.5 | 6 | 25 | 32 | |

300273

## APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12/03/1996 | <0.5 | 9 | 27 | 38 | |
| | | | | | | 03/04/1997 | <0.5 | 7 | 28 | 38 | |
| | | | | | | 06/03/1997 | <0.5 | 6 | 30 | 39 | |
| | | | | | | 09/16/1997 | <0.5 | 7 | 23 | 35 | |
| | | | | | | 12/22/1997 | <0.5 | 11 | 62 | 88 | |
| | | | | | | 03/31/1998 | 1 | 13 | 79 | 109 | H2M |
| | | | | | | 06/16/1998 | <0.5 | 9 | 40 | 51 | H2M |
| | | | | | | 09/09/1998 | <0.5 | 8 | 34 | 42 | H2M |
| | | | | | | 12/01/1998 | <0.5 | 7 | 30 | 44 | H2M |
| | | | | | | 03/24/1999 | <0.5 | 8 | 32 | 40 | H2M |
| | | | | | | 06/11/1999 | <0.5 | 7 | 36 | 45 | H2M |
| | | | | | | 09/14/1999 | <0.5 | 8 | 35 | 42 | |
| | | | | | | 12/07/1999 | <0.5 | 6 | 30 | 44 | |
| | | | | | | 03/07/1900 | <0.5 | 7 | 31 | 38 | |
| | | | | | | 06/07/1900 | <0.5 | 9 | 35 | 46 | |
| | | | | | | 09/06/1900 | <0.5 | 10 | 42 | 52 | |
| N-5484 | M | 500-572 | 20 | Abandoned | Town of Hempstead | 09/23/1977 | | <4 | <2 | bdl | NCDH |
| Local # 1 | | | | 10/91 - Organics | RFWD | 02/23/1978 | | <1 | <1 | bdl | NCDH |
| | | | | Capacity - 1400 gpm | | 10/19/1979 | | <1 | <1 | bdl | NCDH |
| | | | | | | 08/16/1979 | | <5 | <5 | bdl | NCDH |
| | | | | | | 09/13/1979 | | <5 | <5 | bdl | NCDH |
| | | | | | | 02/27/1980 | | 3 | <3 | 3 | NCDH |
| | | | | | | 02/27/1980 | | 4 | <2 | 4 | NCDH |
| | | | | | | 02/27/1980 | | 4 | <2 | 4 | NCDH |
| | | | | | | 02/29/1980 | | 3 | <3 | 3 | NCDH |
| | | | | | | 06/13/1980 | | 4 | <3 | 4 | NCDH |
| | | | | | | 07/15/1980 | | 6 | <2 | 6 | NCDH |
| | | | | | | 07/18/1980 | | 4 | <2 | 4 | NCDH |
| | | | | | | 02/17/1981 | | 12 | 1 | 21 | NCDH |
| | | | | | | 05/04/1981 | | 7 | <1 | 7 | NCDH |
| | | | | | | 05/21/1981 | | 16 | 1 | 21 | NCDH |

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 05/26/1981 | | 7 | <2 | 7 | NCDH |
| | | | | | | 06/19/1981 | | 6 | <1 | 6 | NCDH |
| | | | | | | 02/17/1982 | | 1 | <1 | 1 | NCDH |
| | | | | | | 11/10/1982 | | 9 | 1 | 10 | |
| | | | | | | 01/13/1983 | | 4 | <1 | 15 | |
| | | | | | | 05/23/1983 | | 8 | <1 | 8 | |
| | | | | | | 08/10/1983 | <4 | 8 | <1 | 8 | NCDH |
| | | | | | | 02/17/1984 | | 10 | 1 | 14 | |
| | | | | | | 04/06/1984 | <4 | 11 | 1 | 13 | NCDH |
| | | | | | | 01/31/1985 | 1 | 1 | <1 | 2 | |
| | | | | | | 04/16/1985 | <1 | 2 | <1 | 2 | |
| | | | | | | 02/01/1985 | <1 | 4 | <1 | 4 | |
| | | | | | | 07/28/1986 | <1 | 5 | <1 | 5 | |
| | | | | | | 11/18/1986 | 1 | 6 | <1 | 7 | |
| | | | | | | 01/28/1987 | 2 | <1 | <1 | 2 | |
| | | | | | | 03/02/1988 | <1 | 6 | <1 | 6 | |
| | | | | | | 03/31/1988 | <1 | 4 | <1 | 4 | |
| N-5485 | M | 473-554 | 20 | Abandoned | Town of Hempstead | 09/23/1977 | | <4 | <2 | bdl | NCDH |
| Local # 2 | | | | 10/91-Organics | RFWD | 01/26/1978 | | 24 | <2 | 24 | NCDH |
| | | | | and Nitrates | | 02/23/1978 | | 43 | <1 | 43 | NCDH |
| | | | | Converted to | | 03/15/1978 | | 32 | <2 | 32 | NCDH |
| | | | | USGS moniting well | | 10/13/1978 | | 21 | <1 | 24 | NCDH |
| | | | | in1992 | | 11/06/1978 | | 43 | <1 | 43 | NCDH |
| | | | | Capacity - 1400 gpm | | 12/08/1978 | | 39 | <2 | 39 | NCDH |
| | | | | | | **08/16/1979** | | **60** | **<5** | **60** | **NCDH** |
| | | | | | | **08/29/1979** | | **85** | **<2** | **85** | **NCDH** |
| | | | | | | **08/29/1979** | | **100** | **<2** | **100** | **NCDH** |
| | | | | | | **09/10/1979** | | **48** | **<3** | **48** | **NCDH** |
| | | | | | | **09/13/1979** | | **85** | **<2** | **85** | **NCDH** |
| | | | | | | **02/27/1980** | | **46** | **<3** | **46** | **NCDH** |
| | | | | | | **02/27/1980** | | **57** | **<3** | **57** | **NCDH** |

300275

APP[illegible]DIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 02/27/1980 | | 57 | <3 | 57 | NCDH |
| | | | | | | 02/27/1980 | | 36 | <2 | 36 | NCDH |
| | | | | | | 02/27/1980 | | 37 | <2 | 37 | NCDH |
| | | | | | | 06/24/1980 | | 24 | <3 | 24 | NCDH |
| | | | | | | 06/25/1980 | | 25 | <3 | 25 | NCDH |
| | | | | | | 06/26/1980 | | 33 | <3 | 33 | NCDH |
| | | | | | | 07/03/1980 | | 24 | <2 | 24 | NCDH |
| | | | | | | 07/14/1980 | | 14 | <3 | 14 | NCDH |
| | | | | | | 07/29/1980 | | 13 | <3 | 13 | NCDH |
| | | | | | | 07/30/1980 | | 19 | <2 | 19 | NCDH |
| | | | | | | 07/30/1980 | | 15 | <2 | 15 | NCDH |
| | | | | | | 07/31/1980 | | 27 | <3 | 31 | NCDH |
| | | | | | | 08/01/1980 | | 21 | <3 | 21 | NCDH |
| | | | | | | 08/04/1980 | | 36 | | 36 | NCDH |
| | | | | | | 08/05/1980 | | 32 | <3 | 32 | NCDH |
| | | | | | | 08/07/1980 | | 37 | <3 | 37 | NCDH |
| | | | | | | 08/11/1980 | | 48 | <3 | 48 | NCDH |
| | | | | | | 08/11/1980 | | 30 | <3 | 30 | NCDH |
| | | | | | | 08/12/1980 | | 35 | <3 | 35 | NCDH |
| | | | | | | 08/14/1980 | | 38 | <3 | 38 | NCDH |
| | | | | | | 08/18/1980 | | 42 | <3 | 42 | NCDH |
| | | | | | | 08/21/1980 | | 42 | <3 | 42 | NCDH |
| | | | | | | 08/25/1980 | | 46 | <3 | 46 | NCDH |
| | | | | | | 08/25/1980 | | 40 | <3 | 40 | NCDH |
| | | | | | | 08/27/1980 | | 53 | <2 | 53 | NCDH |
| | | | | | | 09/02/1980 | | 54 | <3 | 54 | NCDH |
| | | | | | | 09/03/1980 | | 44 | <3 | 44 | NCDH |
| | | | | | | 05/21/1981 | | 20 | 2 | 25 | NCDH |
| | | | | | | 06/19/1981 | | 2 | <1 | 6 | NCDH |
| | | | | | | 06/22/1981 | | 11 | <1 | 15 | NCDH |
| | | | | | | 06/30/1981 | | 10 | <1 | 10 | NCDH |

300276

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 07/08/1981 | | 13 | <1 | 14 | NCDH |
| | | | | | | 07/20/1981 | | 18 | <1 | 18 | NCDH |
| | | | | | | 07/27/1981 | | 24 | <1 | 24 | NCDH |
| | | | | | | 08/04/1981 | | 28 | <1 | 28 | NCDH |
| | | | | | | 08/10/1981 | | 16 | <1 | 16 | NCDH |
| | | | | | | 08/17/1981 | | 29 | <1 | 31 | NCDH |
| | | | | | | 09/10/1981 | | 7 | <1 | 10 | NCDH |
| | | | | | | 09/21/1981 | | 29 | <1 | 31 | NCDH |
| | | | | | | 10/06/1981 | | 19 | <1 | 21 | NCDH |
| | | | | | | 11/19/1981 | | 19 | <1 | 22 | NCDH |
| | | | | | | 02/03/1982 | | 19 | 1 | 20 | NCDH |
| | | | | | | 02/25/1982 | | 12 | <1 | 15 | NCDH |
| | | | | | | 03/11/1982 | | 17 | <1 | 19 | NCDH |
| | | | | | | 04/30/1982 | | 11 | <1 | 14 | NCDH |
| | | | | | | 06/18/1982 | | 11 | <1 | 13 | NCDH |
| | | | | | | 07/26/1982 | | 13 | <1 | 13 | NCDH |
| | | | | | | 08/20/1982 | | 6 | <1 | 6 | NCDH |
| | | | | | | 09/23/1982 | | 13 | <1 | 13 | NCDH |
| | | | | | | 10/20/1982 | | 24 | <1 | 26 | NCDH |
| | | | | | | 01/13/1983 | <1 | 7 | <1 | 16 | NCDH |
| | | | | | | 03/11/1983 | <1 | 6 | <1 | 12 | NCDH |
| | | | | | | 04/15/1983 | <1 | 2 | <1 | 4 | NCDH |
| | | | | | | 06/21/1983 | <1 | 5 | <1 | 12 | NCDH |
| | | | | | | 07/15/1983 | <1 | 12 | <1 | 22 | NCDH |
| | | | | | | 09/12/1983 | <1 | 10 | <1 | 23 | NCDH |
| | | | | | | 10/06/1983 | <1 | 22 | <1 | 41 | NCDH |
| | | | | | | 12/02/1983 | <1 | 3 | <1 | 12 | NCDH |
| | | | | | | 02/17/1984 | <1 | 1 | ~~<1~~ | 5 | NCDH |
| | | | | | | 04/12/1984 | <4 | 22 | <1 | 26 | NCDH |
| | | | | | | 05/24/1984 | <1 | 33 | <1 | 43 | |
| | | | | | | 06/19/1984 | <1 | 38 | <1 | 49 | |

300277

APPENDIX A
EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL (feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 09/25/1984 | <1 | 5 | <1 | 6 | |
| | | | | | | 10/11/1984 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/10/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 03/21/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 04/30/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 05/01/1985 | <1 | 1 | <1 | 1 | |
| | | | | | | 06/13/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 07/24/1985 | <1 | 1 | <1 | 1 | |
| | | | | | | 09/04/1985 | 2 | 4 | <1 | 6 | |
| | | | | | | 11/15/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/13/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/24/1986 | <1 | <1 | <1 | bdl | |
| N-5486 | M | 450-556 | 20 | Abandoned | Town of Hempstead | 09/23/1977 | | 12 | 8 | 20 | NCDH |
| Local # 3 | | | | 10/91 - Organics | RFWD | 01/26/1978 | | 15 | 8 | 32 | NCDH |
| | | | | and Nitrates | | 03/15/1978 | | 24 | 6 | 46 | NCDH |
| | | | | Capacity - 1400 gpm | | 03/30/1978 | | 32 | 17 | 70 | NCDH |
| | | | | | | 10/13/1978 | | 88 | 8 | 113 | NCDH |
| | | | | | | 10/18/1978 | | 99 | 10 | 127 | NCDH |
| | | | | | | 12/08/1978 | | 39 | <2 | 39 | NCDH |
| | | | | | | 04/29/1979 | | 40 | 15 | 96 | NCDH |
| | | | | | | 08/17/1979 | | 40 | 15 | 80 | NCDH |
| | | | | | | 08/29/1979 | | 76 | 7 | 96 | NCDH |
| | | | | | | 08/29/1979 | | 64 | 12 | 102 | NCDH |
| | | | | | | 09/10/1979 | | 41 | 15 | 103 | NCDH |
| | | | | | | 09/12/1979 | | 41 | 15 | 97 | NCDH |
| | | | | | | 02/29/1980 | | 70 | <3 | 102 | NCDH |
| | | | | | | 02/29/1980 | | 68 | <3 | 97 | NCDH |
| | | | | | | 02/29/1980 | | 72 | <3 | 104 | NCDH |
| | | | | | | 02/29/1980 | | 170 | 3 | 200 | NCDH |
| | | | | | | 02/29/1980 | | 150 | 3 | 170 | NCDH |
| N-7298 | M | 394-444 | 20 | Active | Village of Hempstead | 11/15/1977 | | <4 | <2 | bdl | |



300278

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Local # 8 | | | | Capacity - 1000 gpm | | 01/05/1978 | | <4 | <2 | bdl | |
| | | | | | | 12/14/1978 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/05/1979 | <1 | <1 | <1 | bdl | |
| | | | | | | 06/10/1980 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/16/1981 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/18/1982 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/22/1983 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/14/1984 | <15 | <1 | <1 | bdl | |
| | | | | | | 11/12/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 02/04/1986 | <10 | <1 | <1 | bdl | |
| | | | | | | 01/13/1987 | <4 | <1 | <1 | bdl | |
| | | | | | | 11/04/1987 | <1 | <1 | <1 | bdl | |
| | | | | | | 03/01/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/20/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 11/29/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/27/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1989 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 09/19/1989 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 12/05/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/20/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 06/28/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 08/02/1990 | <1 | <1 | 2 | 2 | |
| | | | | | | 09/18/1990 | <0.5 | 1 | 2 | 3 | |
| | | | | | | 11/20/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 04/16/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/18/1991 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 08/16/1991 | <0.5 | <0.5 | ~~1~~ | 1 | |
| | | | | | | 09/10/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/02/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/10/1992 | <0.5 | <0.5 | <0.5 | bdl | |

300279

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 06/04/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/01/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 02/28/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/09/1993 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 01/11/1994 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/13/1995 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1996 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/18/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/16/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/02/1997 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/17/1998 | <0.5 | 1 | <0.5 | 1 | H2M |
| | | | | | | 06/16/1998 | <0.5 | 1 | <0.5 | 1 | H2M |
| | | | | | | 09/09/1998 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 12/18/1998 | <0.5 | 1 | <0.5 | 1 | H2M |
| | | | | | | 03/09/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 06/08/1999 | <0.5 | <0.5 | <0.5 | bdl | H2M |
| | | | | | | 09/14/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/07/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/07/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 05/13/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/12/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-7957 | M | 433-519 | | Out of Service | Town of Hepmstead | 09/23/1977 | | <4 | <2 | bdl | |
| | | | | Organic Contaminatic | RFWD | 01/25/1978 | | | <2 | 4 | |
| | | | | Capacity - 1400 gpm | | 10/13/1978 | <1 | <1 | <1 | 1 | |
| | | | | | | 08/16/1979 | | <5 | <5 | bdl | |
| | | | | | | 07/30/1980 | | <4 | <2 | bdl | |
| | | | | | | 02/17/1981 | | <1 | 1 | 4 | |
| | | | | | | 05/26/1981 | | <4 | <2 | bdl | |
| | | | | | | 02/17/1982 | | 1 | <1 | 3 | |
| | | | | | | 01/07/1983 | <1 | <1 | <1 | 2 | |

300280

# APPENDIX A
## EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
## OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
## NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 01/10/1983 | | <1 | <1 | bdl | |
| | | | | | | 04/19/1983 | | <1 | <1 | bdl | |
| | | | | | | 08/10/1983 | | <1 | <1 | bdl | |
| | | | | | | 01/30/1984 | | <1 | <1 | bdl | |
| | | | | | | 02/17/1984 | <1 | <1 | <1 | bdl | |
| | | | | | | 04/12/1984 | <4 | <3 | <1 | bdl | |
| | | | | | | 01/31/1985 | <1 | <1 | <1 | bdl | |
| | | | | | | 01/27/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 11/18/1986 | <1 | <1 | <1 | bdl | |
| | | | | | | 12/02/1987 | <8 | <1 | <1 | bdl | |
| | | | | | | 01/04/1988 | <11 | <1 | <1 | bdl | |
| | | | | | | 03/31/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/30/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 09/23/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 02/08/1989 | <1 | <1 | <1 | 16 | |
| | | | | | | 03/20/1989 | <0.5 | 1 | | 3 | |
| | | | | | | 06/08/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 08/31/1989 | <0.5 | <0.5 | 2 | 2 | |
| | | | | | | 11/16/1989 | <0.5 | <0.5 | 2 | 2 | |
| | | | | | | 01/24/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 04/27/1989 | <1 | <1 | 1 | 1 | |
| | | | | | | 07/10/1990 | <0.5 | <0.5 | 2 | 2 | |
| | | | | | | 12/11/1990 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 03/13/1991 | <0.5 | <0.5 | 1 | 1 | |
| | | | | | | 06/19/1991 | <0.5 | <0.5 | 2 | 2 | |
| | | | | | | 09/11/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 12/03/1991 | <0.5 | <0.5 | 3 | 3 | |
| | | | | | | 03/09/1992 | <0.5 | <0.5 | ~~2~~ | 8 | |
| | | | | | | 06/10/1992 | <0.5 | 3 | 2 | 5 | |
| | | | | | | 09/01/1992 | <0.5 | 2 | 3 | 8 | |
| | | | | | | 12/03/1992 | <0.5 | <0.5 | <0.5 | bdl | |

300281

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 02/03/1993 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/07/1993 | <0.5 | 2 | 3 | 5 | |
| | | | | | | 09/01/1993 | <0.5 | 2 | 4 | 6 | |
| | | | | | | 12/07/1993 | <0.5 | <0.5 | <0.5 | 1 | |
| | | | | | | 03/15/1994 | <0.5 | 5 | 4 | 9 | |
| | | | | | | 06/08/1994 | <0.5 | <0.5 | <0.5 | 5 | |
| | | | | | | 08/23/1984 | <0.5 | 5 | 5 | 10 | |
| | | | | | | 12/06/1994 | <0.5 | <0.5 | <0.5 | 7 | |
| | | | | | | 03/22/1995 | <0.5 | <0.5 | <0.5 | 9 | |
| | | | | | | 06/08/1995 | <0.5 | <0.5 | <0.5 | 5 | |
| | | | | | | 09/14/1995 | <0.5 | 3 | 4 | 10 | |
| | | | | | | 06/21/1996 | <1 | <1 | <1 | 2 | |
| | | | | | | 05/16/1997 | 2 | <1 | 3 | 8 | |
| | | | | | | 07/17/1997 | <0.5 | 5 | 5 | 12 | |
| | | | | | | 09/02/1997 | <0.5 | 11 | 6 | 19 | |
| | | | | | | 11/14/1997 | <0.5 | 18 | 9 | 31 | |
| | | | | | | 01/13/1998 | <0.5 | 19 | 8 | 31 | |
| | | | | | | 02/03/1998 | 2 | 28 | 12 | 42 | |
| | | | | | | 06/19/1998 | 2 | 24 | 17 | 48 | |
| | | | | | | 09/11/1998 | <0.5 | 1 | | 9 | |
| | | | | | | 10/16/1998 | 2 | 6 | 3 | 16 | |
| | | | | | | 06/03/1999 | 2 | 8 | 6 | 22 | |
| | | | | | | 09/09/1999 | 3 | 7 | 7 | 27 | |
| N-8264 | M | 460-510 | | Active | Village of Hempstead | 09/22/1977 | | <4 | <2 | bdl | |
| Local # 9 | | | | Capacity - 1500 gpm | | | No VOC detections | | | | |
| | | | | | | 06/12/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| N-9521 | M | 475-603 | | Active | Town of Hempstead | 12/02/1980 | <1 | <1 | <1 | bdl | |
| | | | | Capacity - 1350 gpm | RFWD | | No VOC detections | | | | |
| | | | | | | 11/18/1999 | <0.5 | <0.5 | <0.5 | bdl | |
| N-10033 | M | 440-540 | 20 | Active | Village of Garden City | 05/15/1984 | <5 | <1 | <1 | bdl | NCDH |
| Local # 15 | | | | Capacity - 1380 gpm | | | | | | | |



300282

# APPENDIX A
# EXISTING WELL INVENTORY AND PREVIOUS GROUNDWATER SAMPLING DATA
# OLD ROSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
# NASSAU COUNTY, NEW YORK

| NYS WELL ID | AQUIFER | SCREENED INTERVAL ( feet below grade) | DIA | STATUS | OWNER | DATE SAMPLED | 1,2-DCE | TCE | PCE | Total VOCs | LAB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N-10034 | M | 509-570 | 20 | Active | Village of Garden City | 10/15/1984 | <10 | <1 | <1 | 4 | NCDH |
| Local #16 | | | | Capacity - 1380 gpm | | | No VOC detections | | | | |
| | | | | | | 04/05/1985 | <20 | <1 | <1 | bdl | |
| | | | | | | 03/24/1986 | <15 | <1 | <1 | bdl | |
| | | | | | | 03/03/1987 | <1 | <1 | <1 | bdl | |
| | | | | | | 02/09/1988 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/01/1989 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 02/06/1990 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/28/1991 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 02/03/1992 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 03/24/1900 | <0.5 | <0.5 | <0.5 | bdl | |
| | | | | | | 06/14/1900 | <0.5 | <0.5 | <0.5 | bdl | |

Lab Key: NWQL -- USGS National Water Quality Laboratory
NCDH -- Nassau County Department of Health Laboratoty
NCDPW -- Nassau County Department of Public Works Laboratory
H2M -- Holtzmacher, McLendon & Murrell Laboratory
Blank -- Uknown Laboratory

Results Key: :ction Limit
bdl -- Below Detection Limits
Blank -- Not Analyzed

300283